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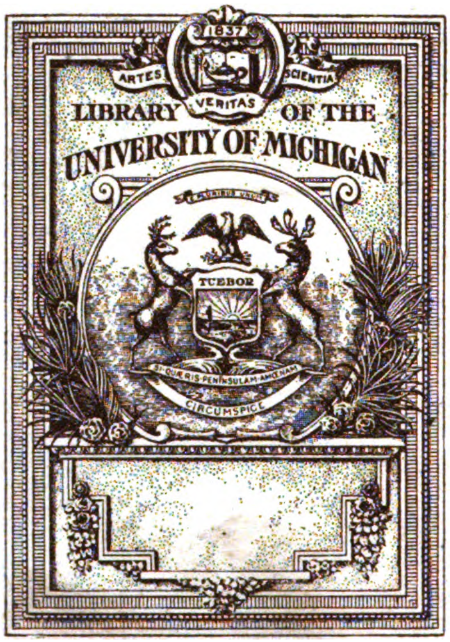

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SESSIONAL PAPERS

VOL. XXXIII—PART IV.

FOURTH SESSION, NINTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1901.

TORONTO:

PRINTED AND PUBLISHED BY L. K. CAMERON

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1901.

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TORONTO.

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No. 3.. Report of the Commissioner of Crown Lands for the year 1900. Presented to the Legislature, 22nd March, 1901. *Printed.*

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No. 4.. Report of the Clerk of Forestry for the year 1900. Presented to the Legislature, 1st April, 1901. *Printed.*

No. 5.. Report of the Bureau of Mines for the year 1900. Presented to the Legislature, 21st March, 1901. *Printed.*

No. 6.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1900. Presented to the Legislature, 19th March, 1901. *Printed.*

No. 7.. Report of the Commissioner of Public Works for the year 1900. Presented to the Legislature, 19th March, 1901. *Printed.*

No 8.. Report of the Inspectors of Factories for the year 1900. Presented to the Legislature, 1st April, 1901. *Printed.*

No. 9.. Report upon the Registration of Births, Marriages and Deaths in the Province, for the year 1900. Presented to the Legislature, 13th February, 1901. *Printed*

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No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1901. Presented to the Legislature, 1st April, 1901. *Printed.*

No. 11.. Report on the Financial Statements made by Loan Corporations for the year 1900. Presented to the Legislature, 1st April, 1901. *Printed.*

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No. 12.. Report of the Minister of Education for the year 1900, with the Statistics for the year 1899. Presented to the Legislature, 14th March, 1901. *Printed.*

No. 13.. Reports of the University of Toronto for 1900-1901. Presented to the Legislature, 22nd March, 1901. *Printed.*

No. 14.. Report of the Ontario Agricultural College and Experimental Farm, for the year 1900. Presented to the Legislature, 26th March, 1901. *Printed.*

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No. 33.. Report of the Provincial Board of Health for the year 1900. Presented to the Legislature, 22nd March, 1901. *Printed.*

No. 34.. Report of the Secretary and Registrar of the Province, for the year 1900 Presented to the Legislature, 22nd March, 1901. *Printed.*

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No. 35.. Report upon the Lunatic and Idiot Asylums of the Province, for the year ending 30th September, 1900. Presented to the Legislature, 13th February, 1901. *Printed.*

No. 36.. Report upon the Common Gaols, Prisons and Reformatories of the Province, for the year ending 30th September, 1900. Presented to the Legislature, 3rd April, 1901. *Printed.*

No 37.. Report upon the Hospitals and Refuges of the Province, for the year ending 30th September, 1900. Presented to the Legislature, 27th March, 1901. *Printed.*

No. 38.. Report upon the Institution for the education of the Blind, Brantford, for the year ending 30th September, 1900. Presented to the Legislature, 13th February, 1901. *Printed.*

No. 39.. Report upon the Institution for the education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1900. Presented to the Legislature, 13th February, 1901. *Printed.*

No. 40.. Report upon the work under the Children's Protection Act, for the year 1900. Presented to the Legislature, 14th February, 1901. *Printed.*

No. 41.. Report upon the working of the Tavern and Shop Licenses Act, for the year 1900. Presented to the Legislature, 13th February, 1901. *Printed.*

No. 42.. Report of the Provincial Municipal Auditor for the year 1900. Presented to the Legislature, 4th March, 1901. *Printed.*

No. 43.. Return from the Records of the several Elections to the Legislative Assembly in the Electoral Districts of North Renfrew, North Waterloo, and Welland, since the General Election of March 1st, 1898, shewing :—(1) The number of Votes polled for each Candidate in the Electoral District in which there was a contest. (2) The majority whereby each successful candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining unpolled. (5) The number of names on the Voters' Lists in each District. (6) The population of each District as shown by the census. Presented to the Legislature, 7th February, 1901. *Printed.*

CONTENTS PART VIII.

No. 44.. Interim Report and Record of Proceedings, of the Commissioners appointed by Commission under the Great Seal to enquire into and report upon questions of Municipal Assessment and Taxation. Presented to the Legislature, 18th February, 1901. *Printed.*

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names of the foreman and jobbers by whom such timber was cut and the quantity cut by each. Presented to the Legislature, 12th March, 1901. Mr. *Allen* *Not Printed.*

No. 60.. Copies of Orders-in-Council, made under the authority of the Act respecting the Department of Education. Presented to the Legislature, 13th March, 1901. *Not Printed.*

No 61.. Return to an order of the House, for a Return of copies of applications for admission into Normal Schools for the year 1901; the date of such applications; the number and names of those admitted; the date on which said applicants were notified of their admission; the number and names of those rejected; the date on which said applicants were notified of their rejection; the cause of their rejection; the numbers of teachers in training, the Normal Schools can accommodate, and the number of teachers in training now actually in attendance at such Normal Schools. Presented to the Legislature, 13th March, 1901. Mr. *Barr.* *Not Printed.*

No. 62.. Return to an Order of the House, for a Return shewing the location of any Cold Storage Station, or Stations, established under Act of last Session, with amounts paid. Presented to the Legislature, 13th March, 1901. Mr. *McLaughlin.* *Not Printed.*

No. 63.. Return to an order of the House, for a Return of copies of correspondence between any member of the Government or the Provincial Board of Health, or any official thereof, and the Mayor of the City of Windsor, or any other person or persons, in reference to an outbreak of smallpox in the County of Essex in March, 1899. Presented to the Legislature, 15th March, 1901. Mr. *Lucas.* *Not Printed.*

No. 64.. Return to an Order of the House, for a Return of copies of all correspondence between the Government of the Province of Ontario, or any member thereof, and the Imperial Government, or any official thereof, or His Excellency the Governor-General of Canada, with relation to the establishment of a Remount Station in Canada. Presented to the Legislature, 15th March, 1901. Mr. *Whitney* *Not Printed.*

No. 65.. Return to an Order of the House, for a Return of copies of all correspondence between the Government, or any member thereof, or any person or persons, or corporations with reference to the employment of Aliens on the construction work of any railway in the Province. Also, for a copy of any report made to the Government, or any member thereof, by any person with reference to such employment. Presented to the Legislature, 19th March, 1901. Mr. *Wardell.* *Not Printed.*

No. 66.. Copy of an Order in Council, amending the rules and regulations for the control and working of the Provincial Diamond Drills. Presented to the Legislature, 21st March, 1901. *Not printed.*

No. 67.. Return to an Order of the House, for a Return of copies of all correspondence, or other documents, concerning the granting, or refusal to grant, a liquor license to either the British Hotel, or the Central Hotel, in the Town of Durham, during the years 1898 or 1899. Presented to the Legislature, 21st March, 1901. Mr. *Lucas.* *Not printed.*

No. 68.. Report of the Department of Fisheries, of Ontario, for the year 1900. Presented to the Legislature, 3rd April, 1901. *Printed.*

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No. 69.. Return to an Order of the House, for a Return shewing the names and addresses of all parties to whom permits were granted during the year 1900, for the destruction of insectivorous birds, or birds' eggs, and shewing as well, upon whose recommendation such permits were granted. Presented to the Legislature, 22nd March, 1901. Mr. *Monteith*. *Not printed.*

No. 70.. Report of District and Township, Agricultural and Horticultural Societies, for the year 1899. Presented to the Legislature, 25th March, 1901. *Not printed.*

No 71.. * Land Settlement in New Ontario, being a short account of advantages offered land seekers. Presented to the Legislature, 27th March, 1901. *Printed for distribution only.*

No. 72.. * Statement concerning the extent, resources, climate and industrial development of the Province. Presented to the Legislature, 27th March, 1901. *Printed for distribution only.*

No. 73 . Return to an Order of the House, for a Return, shewing the names and addresses of all parties tendering—where tenders were called for—for coal, wood and fresh meats, or any of them, for the uses of the Asylum at Brockville, during the year 1900, with copies of the tenders put in by each party tendering; copy of the specifications issued in each case, where tenders were called for, with the name and address of the successful tenderer in each case, together with the kind, quality and quantity of coal, wood or fresh meat, or any of them tendered for. Also the kind, quality and quantity of either of those items for which tenders were accepted in each case and the prices paid. Also the names and addresses of all parties supplying coal, wood or fresh meats, or either of them, without tender, during the above date at the Brockville Asylum, the kind and quantity by each person supplied and the price paid. Presented to the Legislature, 27th March, 1901. Mr. *Joynt*. *Not printed.*

No. 74.. Return to an Order of the House, for a Return, of copies of all correspondence between the Government, or any member or official thereof, and the Inspector of Public Schools in the County of Dufferin, or any other party or parties, respecting the refusal to pay over the Government grant to School Section No 7, of the Township of Melancthon, during the last five years. Presented to the Legislature, 2nd April, 1901. Mr. *Barr*. *Not printed.*

No. 75.. Return to an Order of the House, for a Return shewing: 1. The amount of the bonuses of subsidies voted to Railways by this Legislature, each year, during 1898, 1899 and 1900. 2. The names of each railway and the amount voted to each, during the same period. 3. The amount paid to each railway during each of such years and the condition, or conditions, upon which such payments were made Presented to the Legislature, 4th April, 1901. Mr. *Joynt*. *Not printed.*

No. 76.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, and the Keewatin Power Company, Limited. Presented to the Legislature, 9th April, 1901. *Printed.*

No. 77.. Return to an Order of the House, for a Return, of copies of all correspondence between the Government, or any member thereof, and the Crown Attorney of Halton, or any other person or persons, with reference to the collection of the fines imposed upon those found guilty of bribery in the last local election in Halton. Presented to the Legislature, 11th April, 1901. Mr. *Wardell* *Not printed*

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No. 78..	Return to an Order of the House, for a Return shewing: 1. How much money has been spent on Colonization Roads in the last seven years. 2. How many miles have been built during the same period. 3. What was the cost *per* mile, how much paid for labour; how much to overseers and commissioners, and to whom. 4. What amount was paid for surveys during the same period. Presented to the Legislature, 11th April, 1901. Mr. *Brower*. *Printed*.
No. 79..	Return to an Order of the House, for Return of copies of all correspondence and papers between the Government, or any member thereof, or any Inspector of Factories, or Bureau of Labour, and any person or persons, firm or corporation, having reference to the enforcement, or non-enforcement, or the compliance or non-compliance, with the provisions and requirements of the Ontario Factories Act, during the years 1898, 1899 and 1900. Presented to the Legislature, 12th April, 1901. Mr. *Carscallen* *Not printed*.

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REPORT

OF THE

MINISTER OF EDUCATION

(ONTARIO)

FOR THE YEAR

1900

WITH THE STATISTICS OF 1899.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON,
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1901.

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GENERAL REPORT, 1900.

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EDUCATION DEPARTMENT.

MINISTER OF EDUCATION:

HON. RICHARD HARCOURT, M.A., K.C.

DEPUTY MINISTER OF EDUCATION.

JOHN MILLAR, B.A.

FRANCIS J. TAYLOR,	Chief Clerk and Accountant.
HENRY R. ALLEY,	Clerk and Minister's Secretary.
J. T. R. STINSON,	Senior Clerk.
H. M. WILKINSON,	"
A. C. PAULL,	"
F. N. NUDEL,	"
W. W. JEFFERS,	"
R. J. BRYCE,	Junior Clerk.
S. A. MAY,	"
THOMAS GREENE,	"
WILLIAM LEMON,	"
E. A. FAULDS,	"
F. WOODLEY,	"
MISS E. H. BROWN,	Stenographer.
MISS E. O. CUMINES,	"
J. G HODGINS, LLD.,	Librarian and Historiographer.
MISS J. M. CROOKS,	Assistant Librarian.
S. P. May, M.D., C.L.H.,	Superintendent of Public Libraries and Art Schools.
WILLIAM PAKENHAM, B A,	Registrar of the Educational Council and Chairman of the Board of Examiners.
DAVID BOYLE,	Curator of the Archæological Museum.
L. McCORKINDALE,	Caretaker.

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REPORT

OF THE

MINISTER OF EDUCATION

FOR THE YEAR 1900

WITH THE STATISTICS OF 1899.

To The Honorable Sir Oliver Mowat, K.C.M.G.,

Lieutenant Governor of the Province of Ontario.

May it Please Your Honor:

I herewith present the Report of the Education Department for the year 1900 together with the statistics for the year 1899.

SUMMARY OF STATISTICS.

** Elementary Schools.*

Number of Public Schools		5,654
Increase for the year	67	
Number of Roman Catholic Separate Schools		352
Increase for the year	7	
Number of Protestant Separate Schools		8
Number of Kindergartens		119
Number of teachers		248
Number of Night Schools		16
Number of teachers		37
Amount expended for Public School Houses (sites and buildings)		$322,403
" " Public School teachers' salaries		$2,776,641
" " all other purposes		$921,004

* The Curriculum of Elementary Schools embraces the following subjects: Reading, Writing, Arithmetic, Composition, Drawing, English Literature, Geography, Music, Grammar, History, Physiology and Temperance, Drill and Calisthenics, Bookkeeping, Algebra, Geometry, Botany, Elementary Physics, Agriculture.

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Total amount expended on Public Schools		$4,020,048
Decrease for the year	$23,185	
Number of persons in the Province between the ages of 5 and 21		586,350
Decrease for the year	4,950	
Number of registered pupils of all ages in the Public Schools during the year		429 227
Decrease for the year	7,500	
Average attendance of pupils in the Public Schools during the year		243 325
Decrease for the year	4,455	
Number of pupils in Roman Catholic Separate Schools		41,796
Increase for the year	129	
Average attendance of pupils in Roman Catholic Separate Schools		25,767
Increase for the year	96	
Number of pupils in Protestant Separate Schools		441
Decrease for the year	64	
Average attendance of pupils in Protestant Separate Schools		246
Decrease for the year	20	
Number of pupils attending Kindergartens		11 262
Increase for the year	179	
Average attendance of pupils in Kindergartens		4 701
Increase for the year	128	
Number of pupils attending Night Schools		1,026
Decrease for the year	478	
Average attendance of pupils at Night Schools		262
Decrease for the year	101	
Percentage of average attendance to total attendance in Public Schools		57
Number of persons employed at teachers in the Public Schools during the year: Men, 2612; women, 5,957; total		8,569
Decrease: men, 44; increase: women, 148; increase	104	
Number of teachers who have attended a Normal School		3,805
Increase for the year	220	
Number of teachers who have attended a County Model School in 1900		1,004
Average annual salary of male teachers in Public Schools		$394
Decrease for the year	$2	
Average Annual salary of female teachers in Public Schools		$294
Decrease for the year	$1	

*Secondary Schools.

Number of High Schools (including 37 Collegiate Institutes)		130
Number of teachers in High Schools		568
Decrease for the year	3	
Number of pupils in High Schools		22 460
Decrease for the year	841	
Amount expended for High School teachers' salaries		$528,614
" " " houses (sites and buildings)		$43 213
" all other High School purposes		$150 412
Total amount expended on High Schools		$722,239

* The Curriculum of Secondary Schools includes all the subjects required for matriculation into the University.

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I.—PUBLIC SCHOOLS.

I.—School Population—Attendance.

The School population of the Province, as ascertained by the assessors, is as follows :

Year.	School age.	School Population.	Pupils registered under 5.	Pupils registered 5 to 21.	Pupils registered over 21.	Total number of registered pupils.	Average attendance.	Percentage of average attendance to total number attending school.
1867	5–16	447,726	....	*380.511	†21,132	401,643	163,974	41
1872	5—16	495,756	....	*433,664	†20,998	454,662	188,701	42
1877	5—16	494,804	1,430	488,553	877	490,860	217,184	44
1882	5—16	483.817	1,352	469,751	409	471,512	214,176	45
1887	5—21	611,212	1,569	491,242	401	493,212	245,152	50
1892	5—21	595,238	1,636	483,643	391	485,670	253,830	52
1897	5—21	590,055	1,385	481,120	272	482,777	273,554	56
1898	5—21	591,300	1,387	476,584	223	478,194	273,451	57
1899	5—21	586.350	1,246	469,637	140	471,023	269,092	57

* 5—16 † Other ages.

NOTE.—This Report (for purpose of comparison with previous years in which the R. C. Separate Schools were included with Public Schools) includes R. C. Separate Schools. In the Statistical Tables, A, B, C, D, E, the Separate Schools are excluded.

2.—Classification of Pupils.

Year.	1st Reader—Parts I. and II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.	Writing	Arithmetic.	Drawing.	Geography.	History.	Music.	Grammar and Composition.	Temperance and Hygiene.
1867 ..	79,365	98,184	83,211	68.896	71,987	231,734	241,501	5,450	272,173	61,787	47,618	147,412	....
1872 ..	160,828	100,245	96,481	67,440	29.668	322,688	327,218	57,582	327,139	109,639	110.083	282,156	....
1877 ..	153,630	108,678	135,824	72,871	19,857	396,006	402,248	153,036	375,951	116,865	168,942	226,977	....
1882 ..	165,834	106,229	117,352	71,740	10,357	398,401	419,557	176,432	280,517	150 989	158,694	209,184	33,926
1887 ..	192,361	100,533	108,096	81,984	10,238	466,389	469,445	395,097	316,791	194,754	203,167	570,856	71,525
1892 ..	187,947	96,074	99,345	88,934	13,370	465,516	470,813	435 239	334,947	253,956	220,941	294,331	171 594
1897 ..	181,375	91,330	99,682	89.314	21,076	465.525	471.869	448,444	342,189	284,025	233,915	316,787	215,343
1898 ..	179,360	90,624	97,693	89,670	20,847	464 460	469,603	447,813	348,759	284,153	245,370	313,637	219,776
1899 ..	174,442	93,076	97,702	86,500	19,303	462,012	464 820	444,486	331,184	275,520	242,619	306,257	209,187

Temperance and Hygiene.

It is also worthy of notice that the number of pupils receiving instruction in Temperance and Hygiene has increased from 33,926, in 1882, to 209,187, in 1899. Having regard to the great importance of the knowledge of physiology and the injurious effects of alchoholic stimulants on the human system, provision was made by the statute in 1886 for placing this subject on the course of study for Public Schools. Instruction was also provided under departmental regulation for teachers-in-training at County Model Schools and Normal Schools, to be followed by an examination as an essentia. pre-requisite to

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their final recognition as duly qualified teachers. In 1893, this subject was made compulsory for entrance to High Schools and Collegiate Institutes, so that no pupil who pursues his studies as far as the 5th Form can fail to be reasonably well acquainted with the conditions on which his health and physical vigor depend, as well as with the dangerous tendency of stimulants and narcotics to produce weakness and disease.

Kindergartens.

The system of Kindergarten instruction, first introduced into Ontario in 1882, and subsequently made part of the School System of the Province, by the Public Schools Act of 1885, has met with encouraging success. A report of the pupils receiving instruction in this way was first made in 1892. The report showed that in the short space of ten years, 69 Kindergartens were established, with 160 teachers, attended by 6,375 children under six years of age. In 1899 the number of Kindergartens had increased to 119, with 248 teachers, attended by 11,262 pupils under six years of age.

Night Schools.

The whole number of Night Schools aided in 1899, was 16, the number of teachers 37, and the number in attendance 1,026. This number does not include the attendance upon the classes established by Mechanics Institutes and Art Schools.

3. Teachers' Certificates and Salaries.

Teachers' Certificates.

Year.	Public school teachers.	Male.	Female.	1st class.	2nd class.	3rd class.	Other certificates, including old County Board, etc.	Number of teachers who attended Normal Schools.
1867	4,890	2 849	2,041	1,899	2,454	386	151	666
1872	5,476	2,626	2,850	1,337	1,477	2,084	578	828
1877	6,468	3,020	3.448	250	1,304	3,926	988	1,084
1882	6,857	3,062	3,795	246	2,169	3.471	971	1,873
1887	7,594	2.718	4,876	252	2,553	3,865	924	2,434
1892	8,480	2.770	5.710	261	3.047	4,299	873	3,038
1897	9,128	2,784	6,344	343	3,286	4,465	934	3,643
1898	9,209	2.743	6,466	450	3,456	4.364	939	3,876
1899	9,333	2,713	6,620	524	3,565	4,322	922	3,889

Teachers' Salaries.

Year.	Highest salary paid.	Average salary, male teacher, province.	Average salary, female teacher, province	Average salary, male teacher, counties.	Average salary, female teacher, counties.	Average salary, male teacher, cities.	Average salary, female teacher, cities.	Average salary, male teacher, towns.	Average salary, female teacher, towns.
	$	$	$	$	$	$	$	$	$
1867	1.350	346	226	261	189	532	243	464	240
1872	1,000	360	228	305	213	628	245	507	216
1877	1,100	398	264	379	251	735	307	583	269
1882	1,100	415	269	385	248	742	331	576	273
1887	1,450	425	292	398	271	832	382	619	289
1892	1,500	421	297	383	269	894	402	648	298
1897	1,500	391	294	347	254	892	425	621	306
1898	1,500	396	293	346	250	888	448	626	291
1899	1,500	394	391	314	251	854	438	617	306

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4. Receipts and Expenditure

Year.	Receipts.				Expenditure.					
	Legislative grants.	Municipal school grants and assessments.	Clergy reserve funds, balances and other sources.	Total receipts.	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes, etc.	Rent, repairs, fuel and other expenses.	Total expenditure.	Cost per pupil.
	$	$	$	$	$	$	$	$	$	$ c.
1867..	187,153	1,151,583	331,599	1,670,335	1,093,517	149,195	31,354	199,123	1,473,189	3 67
1872..	225,318	1,763,492	541,460	2,530,270	1,371,594	456,043	47,799	331,928	2,207,364	4 85
1877..	251,962	2,422,432	730,687	3,405,081	2,038,099	477,393	47,539	510,458	3,073,489	6 26
1882..	265,738	2,447,214	757,038	3,469,990	2,144,449	341,918	15,583	525,025	3,026,975	6 42
1887..	268,722	3,084,352	978,283	4,331,357	2,458,540	544,520	27,509	711,535	3,742,104	7 59
1892..	283,791	3,300,512	1,227,596	4,811,899	2,752,629	427,321	40,003	833,965	4,053,918	8 40
1897..	366,538	3,361,562	1,260,055	4,988,155	2,886,061	391,680	60,585	887,335	4,215,670	8 73
1898..	367,010	3,537,352	1,315,083	5,219,444	2,914,830	529,508	63,298	885,078	4,392,714	9 19
1899..	374,277	3,509,059	1,319,382	5,202,718	2,951,812	395,325	64,545	960,377	4,372,059	9 28

II.—ROMAN CATHOLIC SEPARATE SCHOOLS.

Year.	Schools—Expenditure—Teachers.				Number of pupils attending—Number of studies.							
	Schools open.	Total receipts.	Total expenditure	Teachers.	Pupils.	Reading.	Writing.	Arithmetic	Geography.	Grammar.	Drawing.	Temperance and Hygiene.
		$	$									
1867.	161	48,628	42,719	210	18,924	18.924	10,749	10,559	8,666	5,688	....	....
1872..	171	68,810	61,817	254	21,406	21,406	13,699	12,189	8,011	7,908	....	....
1877..	185	120.266	114,806	334	24,952	24,952	17,932	17,961	13,154	11,174	....	....
1882..	190	166,739	154,340	390	26,148	26,148	21,052	21,524	13,900	11,695	7,548	2,033
1887..	229	229,848	211,223	491	30,373	30,373	27,824	28,501	19.608	18,678	21,818	8,578
1892..	312	326,034	289,838	662	37,466	37,466	35,565	35,936	26,299	22,755	32,682	11,056
1897..	340	335,324	302,169	752	41,620	41,620	39,724	40,165	27,471	26,071	36,462	18,127
1898..	345	389,185	349,481	744	41,667	41,667	41,473	41,396	29,578	24,138	37,345	17,964
1899..	352	401,155	352,012	764	41,796	41,796	41,418	41,484	29,352	27,493	37,572	13,692

III.—PROTESTANT SEPARATE SCHOOLS.

The complete list of Protestant Separate Schools is as follows:

No. 5 Bromley, No. 9 Cambridge, No. 1 Marlboro', No. 6 Plantagenet North, Puslinch, Rama, L'Orignal, Penetanguishene.

They were attended by 441 pupils. The whole amount expended for their maintenance was $3,889. Three teachers held a Second Class, seven a Third Class, and one a Temporary Certificate.

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IV.—HIGH SCHOOLS.

(Including Collegiate Institutes.)

1.—Receipts, Expenditure, Attendance, Etc.

The following statistics respecting Hi. h Schools will be found suggestive :

Year.	Schools Open.	Teachers.	Receipts. Amount of fees.	Receipts. Legislative grant.	Receipts. Total receipts.	Expenditure. Paid for teachers' salaries.	Expenditure. Paid for sites and building school houses, rents and repairs.	Expenditure. Total expenditure.	Pupils.	Percentage of average attendance to total attendance.	Cost per pupil.
			$	$	$	$	$	$			$ c.
1867....	103	159	15,605	54,562	134,579	94,820	19,190	124,181	5,696	55	21 80
1872..........	104	239	20,270	79,543	223,269	141,812	31,360	210,005	7,968	56	26 36
1877..........	104	280	20,753	78,762	357,521	211,607	51,417	343,710	9,229	56	37 24
1882..	104	332	29,270	84,304	373,150	253,864	19,361	343,720	12,348	53	27 56
1887..........	112	398	56,198	91,977	529,323	327,452	73,061	495,612	17,459	59	28 38
1892..........	128	522	97,273	100,000	793,812	472,029	91,108	696,114	22,837	60	30 48
1897..........	130	579	110,859	101,250	767,487	533,837	46,627	715,976	24,390	61	29 35
1898..........	130	571	104,486	100,203	779,451	531,887	52,266	729,009	23,301	60	31 54
1899..........	130	568	100,308	103,700	777,343	528,614	43,213	722,239	22,460	59	32 15

2 —Classification, Etc.

Year	English. English Grammar and Rhetoric.	English. English Composition.	English. Poetical Literature.	English. History.	English. Geography.	Mathematics. Arithmetic and Mensuration.	Mathematics. Algebra.	Mathematics. Geometry.	Mathematics. Trigonometry.	Science. Physics.	Science. Chemistry.	Science. Botany.
1867..	5,467	4,091	....	4,634	5,264	5,526	2,841	1,847	141	1,876	840	......
1872..	7,884	7,278	....	7,513	7,715	7,834	6,033	2,592	174	1,921	1,151	......
1877..	8,819	8,772	....	9,136	9,158	9,227	8,678	8,113	359	2,168	2,547	......
1882..	12,275	12,189	....	12,220	12,106	12,261	11,742	11,148	397	2,880	2,522	......
1887..	17,086	17,171	16 649	17,010	16,962	16,939	16,904	14,839	1,017	5,265	3,411	4,640
1892..	22,530	22,525	22,468	22,328	22,118	21,869	22,229	17,791	1,154	6,601	3,710	6,189
1897..	19,591	24,195	24,176	18,318	13,747	19,798	24,105	16,788	1,652	11,002	5,489	12,892
1898..	17,671	22,986	23,067	18,696	11,856	17,751	22,835	16,439	1,409	10,296	5,391	11,375
1899..	16,953	22,314	22,194	22,570	12,371	16,720	21,799	15,701	1,340	10,235	5,934	10,376

Year.	Languages. Latin	Languages. Greek.	Languages. French.	Languages. German.	Drawing.	Vocal Music.	Bookkeeping and commercial transactions.	Left for mercantile life.	Left for agriculture.	Who joined a learned profession.	Matriculated.	Number of schools charging fees.
1867.......	5,171	802	2,164	...	676	.....	1,283	..	....	.. .	56	57
1872	3,860	900	2,828	341	2,176	....	3,127	486	300	213	78	28
1877........	4,955	871	3,091	442	2,755	.....	3,621	555	328	564	145	35
1882........	4,591	815	5,363	962	3,411	.....	5,642	881	646	751	272	37
1887........	5,409	997	6,180	1,350	14,295	1,955	14,064	1,141	882	791	305	58
1892........	9,006	1,070	10,398	2,796	16,980	948	16,700	1,111	1,006	398	471	77
1897........	16,873	1,421	13,761	5,169	12,252	160	11,647	1,368	1,153	409	652	87
.... ..	19,313	1,456	13,866	6,288	10,947	30	11,026	1,491	1,050	499	837	79
....	19,131	1,176	13,464	5,513	10,240	136	10,625	1,449	944	467	814	84

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From a study of these tables, interesting views will be gathered regarding the progress and present condition of our High Schools ana Collegiate Institues. Owing to the organization of continuation classes in Public Schools, there has not been much increase of late years in the establishment of additional High Schools. As Continuation Classes are really doing High School work, it may be seen that there is a steady progress in the support given to secondary education. In 1867 only 1,283 pupils, or 23 per cent. of the whole number, studied commercial subjects, such as Bookkeeping. In 1899 this subject was taken up by 10,625 pupils, or 47 per cent. of the total attendance. In 1867, 5,171 pupils, or 90 per cent. studied Latin. In 1899 the number taking Latin was 19,131, or about 85 per cent. In 1867, 15 per cent. studied Greek, while in 1899 only 5 per cent. were engaged in studying this subject. In 1867, 38 per cent of pupils studied French, and none studied German. In 1899 the number taking French had increased to 60 per cent., while 25 per cent. were engaged in studying German. The greater attention given to Drawing is also a marked feature of the classification.

When High Schools were first established in the Province, their primary object was to prepare pupils for the learned professions, and especially for the University. Although their original purpose has not been ignored, the course of study has been enlarged so as to meet the aims of pupils who intend to follow the ordinary pursuits of life. It is in the High Schools that most students who desire tobecome Public School teachers receive their non-professional training. This is a valuable function of those institutions, and one that has done much to commend them to the general public. Many young men also who intend to follow mechanical pursuits, or prepare themselves for mercantile life, or for agriculture, take advantage of the High Schools. The superior culture which is thus received, proves a valuable investment. In 1872 the number of High School pupils entering mercantile life was 486. In 1899 the number had increased to 1449. In 1872, 300 pupils left the High School for agricultural pursuits, and the number in 1899 had reached 944.

The following table will be of interest regarding the occupations of parents of High School pupils.

Agricultural	7,320
Commercial	6,493
Mechanical	6,237
Professional	2,410

V.—DEPARTMENTAL EXAMINATIONS, ETC.

1. Entrance Examinations, 1877 1900.

Year.	No. of candidates examined.	No. of candidates who passed.
1877	7,383	3,836
1882	9,607	4,371
1887	16,248	9,364
1892	16,409	8,427
1897	16,384	10,502
1898	16,861	9,611
1899	16,309	10,604
1900	16,416	9,574

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2 Non Professional and Matriculation Examinations, 1900

—	High School Entrance.	Part I, Junior Leaving or Public School Leaving.	Part II, Junior Leaving.	Part I, Junior Matriculation.	Part II, Junior Matriculation.	Part I, Senior Leaving or Honor Matriculation.	Part II, Senior Leaving or Honor Matriculation.	Commercial Diploma, Part II.	Commercial Specialist.	Domestic Science.
No. of candidates	16,416	6,489	2,224	1,504	610	426	408	142	13	9
No. who passed	9,574	4,101	1,506	1,178	380	299	307	45	2	6
No. of appeals	......	96	123	14	33	28	28	....	4	....
Appeals sustained	......	55	47	2	9	9	5	....	1	....

3. Professional Examinations, 1900.

—	Kindergarten Assistants.	Kindergarten Directors.	Co. Model Schools.	Normal Schools.	Normal College.
No. of candidates	71	44	1,045	636	183
No. who passed	32	37	1,004	631	162
No. of appeals	5	1	......	....	7
Appeals sustained	3	....	....	....	3

4 Table Showing the Number of Teachers-in-Training at County Model Schools, Normal College, Provincial Normal Schools, Etc.

Year.	County Model Schools.			Normal College.			Normal and Model Schools, etc.					
	No. of schools.	No. of teachers-in training.	No. that passed final examination	No. of teachers.	No. of students	Receipts from fees of Normal College.	No. of Normal School teachers.	No. of Normal School students.	No. of Model School and Kindergarten teachers.	No. of Model School and Kindergarten pupils.	Receipts from fees of Normal Schools, Model Schools and Kindergarten pupils.	Expenditure, Normal and Model Schools.
						$ c.					$ c.	$ c.
1877....	50	1,146	1,124	.....	.. ..	....	13	257	8	643	7,909 22	25,780 88
1882....	46	882	837		......	.. ...	16	260	15	799	13,783 50	44,888 02
1887 ...	55	1,491	1,376	.....	......	..	13	441	18	763	16.427 00	40,188 66
1892....	59	1,283	1,225	10	96	1,630 00	12	428	22	842	19,016 00	45,724 12
1897 ...	60	1,645	1,384	12	180	4,374 00	13	417	23	832	18,797 59	46,390 91
1898....	60	1,288	1,166	12	176	2 600 00	10	458	24	858	20,587 41	46,949 63
1899....	59	1,031	978	12	148	1,845 00	10	478	25	863	19,903 00	46,835 03
1900....	55	1,045	1,004	12	144	1,730 00	16	637	26	893	19,416 00	56,556 99

5. Examination Papers Issued by the Department in 1900

	Sets.	Papers.
High School Entrance	25,000	277,000
Part I. Junior Leaving or Public School Leaving	10 000	50,000
Part I. Junior Matriculation	3,750	15,200

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	Sets.	Papers.
Part II. Junior Leaving and Part II. Junior Matriculation	5,000	95,000
Senior Leaving or Honor Matriculation	3,000	60,000
Commercial Diploma	800	3,200
Commercial Specialist	750	5,400
Kindergarten	750	8,000
Art School	....	9.600
Domestic Science	250	1,250
Normal College	750	12 000
Normal School	1,500	10.650
County Model School	2,750	16,500
Total	54,300	563,800

VI.—TEACHERS' INSTITUTES.

This table presents the work of the Teachers' Institutes for twenty-two years.

Year.	No. of Teachers' Institutes.	No. of members.	No. of teachers in the Province.	Receipts. Amount received from Government grants.	Receipts. Amount received from municipal grants.	Receipts. Amount received from members' fees.	Receipts. Total amount received.	Expenditure. Amount paid for libraries.	Expenditure. Total amount paid.
				$ $.		$ c.	$ c,	c.	$ c.
1877	42	1,181	6,468	1,412 50	100 00	299 75	2,769 44	....	1,127 63
1882	62	4,345	6,857	2,900 00	300 00	1,088 81	9,394 28	453 02	5,355 33
1887	66	6,781	7,594	1 800 00	1,879 45	730 66	10,405 95	1,234 08	4.975 50
1892	69	8,142	8,480	1,950 00	2,105 00	875 76	12.043 54	1,472 41	6,127 46
1897	73	7,627	9,128	2,425 00	2,017 45	901 15	12,446 20	1,479 88	6,598 84
1898	75	8,238	9,209	2,650 00	1,857 50	876 25	12,629 49	1,526 84	6,730 60
1899	76	8,309	9,333	2,425 00	1,922 35	952 60	12,583 67	1,322 41	6,555 75

VII. TECHNICAL EDUCATION.—PUBLIC LIBRARIES, ART SCHOOLS, SCIENTIFIC INSTITUTIONS, ETC.

In consequence of a change in the Act and regulations Requiring Annual Reports from Public Libraries to be made out to the end of each calendar year, instead of 30th April as formerly, the present Report is for eight months only—April 30th to December 31st, 1899.

The following abstracts are from the Superintendent's Report:

1. Public Libraries.

Abstract showing the Counties and Districts in which Public Libraries are established:—Addington (5), Algoma (11), Brant (6), Bruce (22), Carleton (9), Dufferin (10), Dundas (8), Durham (4), Elgin (10), Essex (8), Frontenac (3), Glengarry (2), Grenville (9), Grey (16), Haliburton (2), Haldimand (10), Halton (5), Hastings (5), Huron (15), Kent (13), Lambton (13), Lanark (8), Leeds (4), Lennox (3), Lincoln (7), Manitoulin Island (2), Middlesex (11), Muskoka (4), Nipissing (5), Norfolk (5), Northumberland (8), Ontario (13), Oxford (12), Parry Sound (10), Peel (13), Perth (9), Peterborough (4), Prescott (1), Prince Edward (2), Rainy River (2), Renfrew (9), Russell (2), Stormont (2), Simcoe (16), Victoria (12), Waterloo (14), Welland (9), Wellington (16), Wentworth (8), York (21).

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Abstract showing the Progress of Public Libraries from 1883 to 31st December, 1899.

Year.	Institutes reporting.	Number of members.	Number of evening classes.	Number of pupils.	Number of reading rooms.	Number of newspaper and periodicals.	Number of volumes in libraries.	Number of volumes issued.	Total receipts.	Total assets.
									$ c.	$ c.
1883....(April)....	93	13,672	28	1,758	59	1,540	154,093	251,920	59,716 00	225,190 00
1888.... "	167	32,016	41	1,102	104	3,041	311,048	744,466	103 843 68	403,573 75
1893... "	255	84,088	41	1,117	156	4,745	510,326	1,415,867	160,566 26	685,412 17
1898.... "	347	111,208	2	79	200	5,834	789,082	2,358,140	188,783 21	870,167 54
1899.... "	364	121,397	2	35	200	5,8[illegible]9	862,047	2,547,131	193,421 20	935,975 81
1899. (December).	371	129,713	2	47	188	5,773	918,022	2,042,904	178,642 87	966,667 38

371 Public Libraries (118 Free, 253 not Free) reported for the year ending 31st December, 1899.

23 Public Libraries did not report for the year ending 31st December, 1899.

24 Libraries, which have not yet reported, were established in the year 1900.

Total number of Libraries, 418.

2. Art Schools, etc.

The following Abstract shows the number of certificates and medals awarded to Art Schools, Ladies' Colleges, etc., for drawing, painting, etc., at intervals since 1883

Year.	Number of Art Schools, etc.	Primary Art Course.		Advanced Art Course.		Mechanical Art Course.		Industrial Art Course.	Extra subjects.	Departmental medals, etc.			
		Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Painting, modelling, wood carving, etc.	Gold medals	Silver medals.	Bronze medals.	Special certificates.
1883........	1	124	......	31	.....	1	....	......	......	...	....	.....	......
1888........	57	2,979	133	151	9	50	2	24	108	1	1	4	1
1893........	85	4,753	220	301	13	139	10	11	165	1	16	11	21
1898........	55	3 166	149	540	18	42	....	30	171	1	2	11	14
1899........	62	3,993	160	499	22	75	......	42	154	1	3	10	14
1900........	47	3,130	130	367	17	53	....	43	156	1	3	13	17

Fine Arts Exhibitions.—An exhibition of students' work, and paintings from the Provincial Art Gallery, was held at Hamilton in July, 1900. An exhibition of drawings and paintings from South Kensington, and the paintings from the Provincial Art Gallery, was held at Ottawa in September, 1900.

Ontario Society of Artists.—This Society, having complied with the regulations of this Department, was paid its annual grant as usual.

3.—Literary and Scientific Institutions.

Nine Literary and Scientific Institutions were paid grants for the year ending 30th April, 1900. All of these have libraries and some of them have museums, publish annual transactions, and give popular lectures on science, literature and art.

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GENERAL REMARKS.

I. RURAL SCHOOLS.

The Rural School problem is one not confined to Ontario. The tendency of the population to move to cities and towns from country districts, appears to be general at the present day. It is due no doubt to great economic causes. The increased application of skilled labor to various pursuits, has lessened the number needed on the farm. This is especially the case in old districts, where clearing the land, lumbering, making fences, and the digging of drains, no longer call for so much labor as formerly. There is more demand for machinery; and operations once carried on in small villages and at "Cross Roads" are now attended to in the city factories. The population has, as a consequence, decreased in country districts, and a decreased attendance is found in rural schools. The children are generally young, and it is seldom that grown-up pupils return in such large numbers as years ago to the school for the winter months. These conditions have doubtless some disadvantages, although there are counteracting gains in the superior training given to young pupils. As in the other Provinces of Canada as well as in every State of the American Union, there has been a large increase in the proportion of women teachers. For young pupils, such as are generally found in rural schools, the change is beneficial. It would be a misfortune if the claims of the advanced pupils of country schools should be neglected. For a school with an experienced teacher, the well-known difficulties may be readily met. A skillful teacher will have less difficulty in "handling" a number of classes; indeed, the knowledge necessary for a country teacher in matters of classification and organization must necessarily be of a special character. One who is able to look after the interests of all grades of pupils in an ungraded school, has special fitness for the work.

The teacher of a rural school has good facilities for training pupils in habits of observation. Attention to "Nature Study" should always be a prominent feature of the programme in rural schools. In this respect children who reside in the country have excellent opportunities and if their powers of observation and reflection are wisely directed by an intelligent teacher, very great advantages must be the result. It should never be forgotten that the best physical laboratory is the well regulated farm. Here the children study nature at first hand. They are taught to observe the growth and life of plants and animals. They learn manual training at home. Here they may breath pure air and become familiar with the beauties and wonders of the world of nature. The country also presents in many respects special means for the formation of character. The disadvantages of ungraded schools are evident, but they may be partly met by (1) the formation of rural school libraries, (2) the employment of teachers of higher qualifications and (3) the consolidation of school sections.

In rural schools geography may be made one of the most valuable subjects of study. For pupils in elementary classes, a knowledge of the earth and what pertains to it is generally very attractive. All those sub-departments of natural science which come within the range of the child's observation should engage his attention. To confine early instruction in natural science to one or two sub-departments is now regarded by education-

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ists as unsound. Children are readily interested in the various natural phenomena of their surroundings and attention should early in life be directed to whatever of an elementary nature pertains to botany, chemistry, physics, physiology, zoology, meteorology, geology, etc. As a distinguished educationist remarks: "The co-ordination of the elements of these several sciences found in the experience of the child is a first step towards science and the pupil who has taken his first lesson in this direction has acquired in some feeble way a scientific habit of mind which will, in anyone happily constituted, exercise its influence over all his future mental growth."

The statement is sometimes made that Agriculture cannot be taught in our rural schools. This opinion is largely due to a mis-conception regarding the kind of knowledge which lies at the basis of the study of Agriculture. The farmer is specially interested in "nature study," and a teacher in a rural school who is giving instruction in elementary natural science is in reality beginning the study of agriculture. In this connection the opinions of Dr. W. T. Harris, United States Commissioner of Education, are worth quoting: "Of course, in giving this human lesson in the study of geography, one draws upon the elements of many other sciences, as, for instance, the various social sciences explaining man's progress in agriculture, mining, manufactures, and commerce; explaining the political differences that show themselves in the formation of the nations of the world which vary each from another in the degree in which they have realized individual freedom of the citizen, and in the creation of instrumentalities for giving all the people the opportunities of education in science, literature and the arts. Besides these tributary sciences there are others: the science of comparative religion and comparative aesthetics of fine arts, and the history of the progress of men in four or five grades of civilization—savage, barbarous, half-civilized, civilized and enlightened, for example. In general, geography treats, in this phase, of the institutions of society by which the social whole is made to help the individual, and the indvidual made in turn to help all his fellow-men by means of the organized institutions in which he lives.

"Every child holds in his consciousness some elements out of all these spiritual sciences, from jurisprudence down to the simplest arts of the savage, and the great work accomplished by the elementary school in the study of geography is this: It marshals the child's experience along each of the lines of the sciences of nature and the sciences of man (as society and individual), and makes him conscious of these apperceptive centres in his experience, and likewise gives him the outlines of the great provinces of human knowledge, to which these serve as keys. It is true that he does little more than apply his key and open the door, without advancing far beyond the threshold. But ever after he remembers, in relation to some or any of his experiences, that one of them unlocks the door which leads into mineralogy, geology, botany, physiology, or meteorology; or, again, another experience explains for him the social combination of man in productive industry in some one department; or to the law-making and political activity of man, by which he organizes society in such a way that each individual receives freedom as his heritage; or another experience applies to religion and literature, and the fine arts. What a difference it makes to the child to know that each fact of his humble experience is given him as a key to unlock some particular door leading into the great temple of human knowledge?

"It will have struck all observers of school studies and practical devices for teaching

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them that the child does not deal to any great extent with pure and simple sciences, although he has to do with pure and simple elements. He passes from one simple element derived from one science to another simple element derived from a different science, but not straight forward on the same road of investigation. All his studies are composite. He learns a lesson in addition, or multiplication, or some other elementary process of arithmetic, and then he proceeds with it at once to applications which involve the combination of the arithmetical contingent with another contingent taken from geography, or history, or from one of the industries, such as manufactures or commerce, mining or agriculture.

"It was pointed out in the report of the Committee of Fifteen that geography, one of the most important of all branches taught in the common schools, is a composite science, or a conglomerate of several sciences united with several arts. Instead of being a defect, this is a most important advantage to an elementary school study, provided the fragments of science brought together are such as may be easily grounded in the child's experience. The child of the primary school has not built up his apperception centres to such a degree as to follow pure science, nor can he be taught the methods of advanced and specialized science at his age without injury. Those authorities that are recommending the early introduction of specialization and advanced scientific methods do not consider that they are trying to demolish at one blow all that has been learned with regard to the methods of instruction in elementary schools, for they sacrifice the many-sided interest which is necessary for the best progress of the pupil. The child of four or five years of age has many interests, but he has no great stock of accumulations in any one direction. The good primary teacher ascertains these various elements of interest and brings them up into consciousness and skilfully combines these isolated elements. Each lesson should bring the child's mind from these elements of his experience toward the seizing of some phase of an abstract scientific principle. If, however, the line of investigation which approaches a scientific principle is to be followed indefinitely, the second or third step would bring the pupil into a region entirely beyond his experience, and it would not be possible for the teacher to retain his interest. Like Antæus, the child's mind must be brought down and made to touch the ground of his experience again and again at every step, and this has to be done in many sciences rather than in the same science. But the child whose experience has been marshalled by the skillful teacher and made conscious, the child who has learned how to apply his experience as a key to the explanation of things just beyond the range of his immediate experience, is a child who has gained in power of apperception and who has taken the first essential step toward attaining a scientific mind."

Respecting the study of agriculture, Dr. C. R. Skinner, the New York State Superintendent of Education, remarks as follows :

"I have no desire to encourage the introduction of fads or doubtful experiments in our schools—they usually need little encouragement—but I wish to repeat a recommendation made in my report of 1896, that local school authorities may well encourage, wherever practical the study of the elementary principles of agriculture. In this way we can do something to make 'life on the farm' more attractive and more profitable, and may n some degree counteract the constant tendency to overcrowd our cities and weaken our ountry districts, a condition which must inevitably produce unsatisfactory results.

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"If agricultural pursuits could be made more attractive, our boys would be contented to remain longer on the farm. The study of agriculture, with all the attendent experiments, could be made highly interesting and would give our children an inspiration. The country boy has many opportunities for the study of nature and all that it implies which are denied the children of the cities. The country boy, almost before he is aware of the fact, has a pretty fair knowledge of botany, geology, biology and zoology. His knowledge of plants, trees, animals and rocks is the basis for a useful education."

It will also be well to quote in this connection the views of the French Minister of Public Instruction.

"Elementary instruction in agriculture should be addressed less to the memory than to the intelligence of the children; it should be based on the observation of daily facts in country life and on simple experiments, applying material resources at hand, and designed to prove the scientific fundamental ideas of the most important agricultural operations. Children in rural schools should learn, above all things else, the reason of these operations, with an explanation of the accompanying phenomena, and not the details of the methods or effects; still less a list of precepts, definitions, or agricultural recipes. The first thing for every agriculturalist to learn, things that must be learned by the experimental method, are the conditions essential for the growth of garden vegetables, the reasons for habitual work in common farming, the rules of hygiene governing man and the domestic animals.

"No matter how well a manual may be, a teacher would pursue a wrong course in the instruction of agriculture if he were to require his pupils to study and recite from the text book. It is positively necessary to instruct by simple experiments, and above all by observation. It is only by placing phenomena directly before them for observation that children can be taught to observe and fix in their minds the fundamental ideas on which modern agricultural science rests; children in the country are dependent upon schools for these ideas. It is useless to teach pupils what their fathers know better than the teacher and what they are sure to learn by their own practical experience.

"Schools should confine themselves to preparing children for an intelligent apprenticeship in the calling that will yield them a livelihood and to cultivating in them a taste for their future profession. A teacher should never forget that the best way to make a workman love his work is to make him understand it. The end to be attained by elementary instruction in agriculture is to give the greatest number of children in rural districts the knowledge indispensable for reading a book on modern agriculture, or attending an agricultural meeting with profit; to inspire them with love of country life and the desire not to change it for the city or manufactories, and to inculcate the truth that the agricultural profession, the most independent of all, is more remunerative than many others for industrious, intelligent, and well-instructed followers."

II.—CONSOLIDATION OF SCHOOL SECTIONS.

One of the chief defects of rural schools is the impossibility of that classification and organization of pupils which pertain to urban schools. To overcome the difficulty, successful efforts have been made in many States of the American Union towards the consolidation of a number of districts. With township Boards of Trustees which prevail generally in the Eastren States, facilities for uniting the schools are ready at hand. The plan is to

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have one central school in the principal town of the municipality, the pupils from the more distant portions being conveyed to and from the school at the expense of the Board. This system was started in Concord, Mass., some years ago; was extended to nearly all parts of the State, and is now common in all the Eastern States, and has gained evidently a permanent hold also in the Western States. By this method better teachers are secured, a better classification of pupils and greater uniformity of school rates. It is not necessary here to mention at length the advantages and disadvantages connected with this method of providing graded schools. It is sufficient merely to say that wherever the consolidation of school districts has taken place, there is no desire to revert to the former conditions. The pupils like the system, and it receives universal favour among teachers. Wherever adopted it has gained the favour of the parents and is regarded by those who have studied it and understand its workings, as the most practical advance in methods of rural education. The cost of tuition is reported in many cases to have been considerably reduced, although the instruction received is of much higher order than in ungraded schools.

The amendment made in 1899 to the Public Schools Act made some provision for consolidating sections in the sparsely settled portions of the Province. So far no successful efforts have been made to take advantage of the law. Section 20 of the Public Schools Act of 1896 makes provision by which a school section may, under certain conditions have the children attend a school in an adjoining city or town. There is no reason why this provision might not be extended also to villages. So far there has been only one instance of advantage being taken of this section of the School Law. The present law pertaining to Continuation Classes goes a step further and allows school corporations whether Public or Separate to unite in forming Continuation Classes. It is quite probable that the most prudent steps towards consolidation for this Province would be for school sections in the neighbourhood of a town or village to unite, in the first place so far as concerns Continuation Classes, and, in the second place, for all classes of pupils. There is no reason why all the schools in the immediate vicinity of any of our villages and towns might not unite and accomplish what has been accomplished with so much advantage in many parts of the United States. If some Trustee Boards would take the initiative in this direction, it is most probable that results would follow which would soon revolutionize the work done in many rural schools.

It will be of interest to observe how the plan of consolidating school districts has worked in other places. The following from the report of the U.S. Commissioner of Education will show the results in the State of Ohio:

"The experiment was watched with much interest by educators, and those interested in education, throughout Ohio. Some thought the plan impracticable, others championed it with ardor. The latter looked upon it as the most practicable and economical solution of the vexed 'country school problem.' This was specially true among educators of neighbouring townships and counties. They saw realized in this plan their hope of giving to the country pupil all the advantages of education which the city boy or girl enjoys, and they urged the adoption of the plan in the localities in which they taught schools. Accordingly, two years later, a more general law was passed, which provided for the extension of the 'Kingsville plan' to other townships. It has also been adopted in town-

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ships in New York, Pennsylvania, West Virginia, Kentucky and other States of the West, since its trial in Kingsville, Ohio.

"The residents of the sub-districts of Kingsville Township which have adopted this plan, would deem it retrogression to go back to the old sub-district plan. It has given the school system of Kingsville an individuality which makes it unique and progressive Pupils from every part of the township enjoy a graded school education, whether they live in the most remote corner of the township or at the very doors of the central school. The line between the country-bred and village-bred youth is blotted out. They study the same books, are competitors for the same honours, and engage in the same sports and pastimes. This mingling of the pupils from the sub-districts and the village has had a deepening and broadening influence upon the former, without any disadvantage to the latter. With the grading of the school and the larger number of pupils have come teachers of a more highly educated class. Higher branches of study are taught, the teachers are more conversant with the needs of their profession. The salaries are larger, the health of the pupils is preserved, because they are not compelled to walk to school in slush, snow or rain, to sit with damp and perhaps wet feet, in ill-ventilated buildings. Nor is there any lounging by the wayside. As the use of indecent and obscene language is prohibited in the wagons, all opportunities for quarreling or for improper conduct on the way to and from school are removed. The attendance is larger, and in the sub-districts which have taken advantage of the plan it has increased from 50 to 150 per cent. in some cases; truancy is unknown. It has lengthened the school year for a number of the sub-districts; it has increased the demand for farms in those sub-districts which have adopted the plan, and real estate therein is reported more saleable. The drivers act as daily mail carriers. All parts of the township have been brought into closer touch and sympathy.

"The cost of maintenance is less than that of the schools under the sub-district plan; the township has had no schoolhouses to build; it has paid less for repair and fuel. Since the schools were consolidated the incidental expenses have decreased from $800 to $1,100 per year, to from $400 to $600 per year. In the first three years following its adoption Kingsville Township has actually saved $1,000.

"State Commissioner of Public Schools, O. T. Corson, in his forty-third annual report to the governor of Ohio, referring to the Kingsville experiment, states that 'the expense of schooling the children has been reduced nearly one-half, the daily attendance has been very largely increased, and the quality of the work done has been greatly improved.' Prof. J. R. Adams, superintendent of schools of Madison Township, Lake County, says that 'under the new plan the cost of tuition per pupil, on the basis of total enrollment, has been reduced from $16.00 to $10.48; on the basis of average daily attendance, from $26.66 to $16.07. The total expense will be about the same in this district as under the old plan, but the cost per pupil will be much less.' This is because the school attendance has increased in Madison Township from 217 to 300 pupils, since the plan went into operation.

"In the townships where the 'Kingsville plan' has been adopted it has met with general favour, and has received the warmest support of educators, who regard it as a long step forward toward placing the country schools upon a higher plane of efficiency. Superintendent Adams, referred to above, writes: 'A trial of this plan of consolidating

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our schools has satisfied me that it is a step in the direction toward whatever advantages a well-graded and well-classified school of three or four teachers has over a school of one teacher with five or eight grades. I am more thoroughly convinced than ever that centralization is the true solution of the country school problem.' Prof. F. E. Morrison, to whom its adoption by the board of education in Kingsville Township was in a great measure due, speaks of it as 'a system of education superior to any in the State of Ohio, and one which is to be the system of the future.' And in the forty-fifth report to the governor of Ohio, State Commissioner O. T. Corson, referring to the 'Kingsville plan,' says: 'I anticipate none the less an increasing tendency in all parts of the State, year by year, to make the law serviceable in reducing school expenses, and in extending the benign influence of well-graded instruction. Incidental to the operation of this law, township high schools will be established, township libraries will be built up, and possibly it is no idle hope that the same wagons that carry the children to and from school may also carry, under Government contract, the mails, and distribute them free to our farming communities.'"

III.—SCHOOL LIBRARIES.

In a few rural schools, Libraries have been established by the trustees; but it is to be regretted that very little has yet been accomplished in this direction. Trustees are only beginning to be alive to the necessity of supplying good reading matter for the pupils attending the Public Schools. Doubtless great advantages have resulted from the establishment of Public Libraries, but it is only in urban municipalities that the benefits from them are received. The needs of children do not, however, receive first consideration. To spend largely in getting books for a Public Library is praiseworthy. It would be more gratifying, however, if more liberality were shown in providing books accessible to children. If the pupils of our schools are to have the right kind of direction, opportunities should be given them to obtain books from the school library. It is not enough for children to be guarded from the evils of bad literature. They should receive wise counsel respecting the most desirable books to read. An important function of the school is to train the reading habits of the pupils. Where so many books are available, only the best should be placed in the hands of children. They should not be allowed to select for themselves; and if they are dependent upon parents, the matter may be seriously neglected. It should never be forgotten that the boy or girl who leaves the school with a taste for good reading has received the most important part of an education. There is too much attention given, even by grown-up people, to light literature. Unless the love for good reading is gained while at school, fiction, and that not of the highest order, will continue to engage chief attention. If each rural School Board expended a small sum every year for good books, in a short time a very fair school library would be established. It is not necessary to have great variety in the books selected. The object should be to place in the hands of pupils the master pieces of English literature. The dullness so often attributed to country life might be very much lessened if more time were given to judicious reading. In cities and towns where Public Libraries are available, the needs o the pupils may not be so great. It cannot be denied, however, that the money expended for school libraries, including that for supplementary reading, secures advantages largely in excess of what are derived from ordinary Public Libraries.

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By the formation of travelling libraries much may be done for the adult part of the population in the more remote districts. It is earnestly to be hoped that the trustees of many a rural school may take advantage of their powers and provide for the section the nucleus of a small school library. By the enterprise of teachers and Inspectors, progress has already been made in some localities, but it is to be regretted that the needs of children in country districts have not yet received full recognition.

In High Schools and Collegiate Institutes, much has already been accomplished in promoting supplementary reading. Under the direction of the Principal, a judicious selection of standard works is made by the Board. In some places good use is made of the Public Library, and it would be desirable if greater facilities were provided by which High and Public School pupils might have access to suitable works from the Libraries. In many cities and towns of the United States the Public Library is managed so as to become an important aid to the teachers of English literature. Frequently the schools are made regular distributing centres for the Public Library. In the High Schools and in the higher grades of the public schools it may frequently be impossible to do in the schools all their reading outlined by the teachers. By having each member of the class supplied with a copy of the book, the reading can be done at home in place of what is often done now without proper direction. Home work of this kind might very well take the place of the difficult lessons too often assigned for home preparation. Another advantage which will doubtless result by encouraging pupils to read good books at home is the greater interest taken by parents in the education of their children. It is to be hoped that the time is not distant when every School Board will have enough sets of the best books to furnish pupils practically all of the home reading that can be done in connection with the ordinary duties of the school. It is evident valuable results may be accomplished if School Boards, Library Boards, and teachers co-operate in promoting what is after all one of the most important objects of our educational system. It should never be forgotten that it is more important to form the habits and tastes of children, than to give them information which may possibly be forgotten after leaving school.

On the question of supplementary reading one of the leading librarians of Boston remarks:—

"Books for general reading, to be used for the purpose just named, should, when possible, be furnished in sets, the number of volumes in a set being equal to the number of pupils in the class. These books should be well written, have a high moral purpose, and be of such a character as to interest the pupils for whom they are intended. They should be books of travel, biographies of famous men and women, historical stories, and works of fiction suited to the age and intellectual growth of the pupils. In the selection of books, it should be borne in mind that with parents or with teachers children will read and will enjoy books of a much higher grade than they would be likely to select for their own reading. Boys and girls of twelve or fourteen years of age, whose tastes have had no special training, will listen with eagerness to Thackeray, Dickens, and Scott, to Longfellow, Holmes, and Tennyson, if a mother or some favorite teacher reads aloud to them. Care must be taken, however, that the reading matter be suited to the age and advancement of the pupils, for much of the reading should be done by themselves. The reading from the large sets of books just described should be done by the pupils at home.

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A chapter or a given number of pages should be assigned by the teacher, to be read by the children as an evening lesson. The teacher must prepare his work as carefully as the work on any evening lesson should be prepared. Notes should be taken of points worthy of being described. In short, such preparation by the teacher should be made as will enable him to call the attention of his pupils to what is likely to interest or instruct."

On the formation of rural school libraries the views given in the last report of the New York State Superintendent will be of interest :—

"Each rural school should have a library of from twenty-five to a hundred volumes, which should include wholesome and interesting books for the pupils of all the grades. A library must usually grow by small annual or occasional accretions. It is important to secure the best books in the first purchase, so that the good results of their use may be quickly apparent. The child must get the reading habit before he gets the study habit, and if the teacher must choose for the first purchase between a few entertaining and inspiring stories, like Black Beauty, and a few books of information, like the children's cyclopaedias, she should choose the former. When the children and parents have fairly grasped the idea that books are a means of pleasure, and inspire to better living, the library will grow. The wholesome books that are read for pleasure will procure the means to buy the books of information.

"The teacher who would secure a school library should, therefore, know and love the children's classics. If she does not know them, she must learn of them through other teachers, librarians, county superintendents, state departments of education, or educational journals. When she has read the best of the books, she will find herself eager to have others enjoy them. Enthusiasm for books is the foundation of success. Enthusiasm begets enthusiasm. I have heard that 'this is a good book' goes unheeded, when 'this is a delightful book,' given convincingly, inspires the pupil to get and read.

"When the teacher knows and loves the best books, she should find means to get one or more of them, and use them to show pupils and parents that good books give pleasure, inspiration to better living, and broaden the school work. Through doing this she would find the means to get more books."

The following practical suggestions from a librarian of Denver, Colo., regarding the use of libraries by teachers are worth quoting : —

" But how shall this training be given, is the question? How shall be bring the child in touch with good books? Our experience in District No. 17, Denver, leads us to believe that each schoolroom should have its library. We have found that a collection of fifty books in a room, chosen with reference to the age and ability of the pupils in that room, is the most satisfactory means of forming a taste for good literature. We have tried other methods—the central library, the library in the principal's office, and the plan of moving books from one room to another. The room library—that is, a certain number of books which are the permanent property of the room—has proved the best, because it acts as a training school for the use of a larger public library. We favour the room library for the purpose of getting the little folks accustomed to the use of the books, and for the immediate use of the pupils in the upper grades. The more expensive books which cannot be afforded for each room are kept in the principal's office. Thus the pupils are led to the public library, for the use of which these small collections have well trained them. That this room-library plan increases the demand for books from

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the public library has been demonstrated to us by the greater number of cards now held by the pupils.

"Beginning with the second grade, each room in the district has its own collection of books, which remain there from year to year. As the children go from grade to grade they are each year brought in contact with another set of books new to them. Instead of moving the books, we move the children. Each room has its reference books and its books for lending. When not in use, these books are on a table or on shelves accessible to the children at all times. The pupil thus becomes acquainted with the books, and feels a personal pride of ownership, and the close contact of the child with the books teaches him to love and respect them. He becomes interested in reading and familiar with his own small library."

IV. PHYSIOLOGY AND TEMPERANCE.

Discussions have taken place within the last year respecting the requirements prescribed for the Public Schools in "Physiology and Temperance." Some desire has been expressed in favour of having the course modified and removed from the subjects of examination for admission to High Schools. Such proposals deal with two very important aspects of the matter, and it would be well in any consideration given to the subject to avoid all confusion. It would be useless for anyone to attempt to minimize the evils of intemperance, and, therefore, any step which would cause less attention to be given in our schools to the injurious effects of alcoholic stimulants should be taken with extreme caution. In all civilized countries public sentiment is strongly in favour of guarding children, by judicious instruction, from the dangers of intemperance, which is one of the greatest evils that can afflict any people. Provision was made by statute in 1886 for placing temperance as one of the subjects on the course of study for Public Schools. Under regulations of the Education Department, instruction was also provided for teachers in training at County Model Schools, and at the Normal Schools. To pass an examination in this subject is now an essential pre-requisite for obtaining a certificate to teach. Every pupil attending our Public Schools must receive in the early part of the course instruction of a conversational character upon the physical effects of intoxicating liquors. In the fourth form of the Public Schools, increased importance is attached to "Physiology and Temperance" by requiring every pupil who writes at the High School entrance examination to pass an examination in the subject. It is held by some persons that greater facilities should be provided for enabling pupils from the Public Schools to commence the High School course at an earlier age. On the other hand, a great many contend, and with much force of argument, that the affect of the High School entrance examination on the Public Schools must have prior consideration in any modification that is to be made. It would not be wise in the interests of the youth of our country to overlook the dangers that would arise if any barrier to intemperate habits were removed. There may be differences of opinion among our citizens respecting the best legislative methods of destroying the palpable evils of intemperance. There will, I think, be a general concurrence in favour of saving children, so far as possible, from the formation of habits so destructive to the happiness of the home and the happiness and prosperity o the individual and community. Any modification of the policy heretofore pursued should, I think, have fully in view the interests of temperance. Any change made in

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this direction should be based on sound educational principles. All will admit that the moral aspect of the question should receive first consideration. It will not be out of place to quote the views of several American educationalists regarding the scientific teaching of temperance in the schools of the United States:—

"The subject of physiology and hygiene, with special reference to the effects of alcohol and narcotics, receives special attention in the new course of study.

The teachers of Nebraska are heartily in sympathy with the spirit of the law, providing for such instruction. Whenever such teaching is neglected, it has usually been due to a lack of definite outlines and directions. Great care has been taken to supply this need in the new course."—*H. R. Corbett, Nebraska State Superintendent.*

"That the law providing for regular and systematic instruction in physiology with special reference to the effect of stimulants and narcotics upon the human system has been generally observed, is evidenced by the fact that but one complaint has been made to the department during the past year. It is nevertheless true that in many districts it is honored more in the breach than in the observance. The attention of teachers is called to their duties in the matter at institutes and summer training schools and in teachers' associations and examinations held by county superintendents. Most of them are in cordial sympathy with the object of the law, and enter into the work with alacrity and a sincere desire to carry out its provisions conscientiously and faithfully. Much good has already been done, and there is apparently no opposition to it."—*W. W. Pendergast, Minnesota State Superintendent.*

"Every county superintendent reports that in the county institute he gave the subject the consideration which the law requires. The secretaries for the different school boards report that the law is generally complied with in the graded schools of the State, as well as in all the schools in the country districts.

"As far as the letter of the law is concerned there is a general compliance with its provisions. Not that there are no exceptions. There are some districts in which the most conscientious teacher, owing to complications beyond her control, finds it difficult to decide what course should be pursued. In regard to what precise method the teacher is to employ, the law is silent, as it should be. The term scientific temperance instruction is misleading. The aim should not be alone to implant in the mind of the child a vivid idea of the evils of intemperance, lest that which we hold up as a warning may become, first, an impression, and afterwards a hideous growth. There must be something more than this.

"The chief aim in temperance instruction should be to convince the child that the only path to happiness or success lies through a life of temperance and sobriety. A high ideal of a noble life, like a beautiful picture on the wall of a room, is an ever-present, all powerful influence for good.

"The law itself is one in which the spirit far over-shadows the letter. Unless the instruction given reaches the heart and convinces the judgment, it fails of its purpose. The boy is not greatly benefitted by the instruction given in the school, if, after reciting his lesson upon the ruinous effects of tobacco upon his system, and perhaps before he leaves the schoolhouse yard, he lights his cigarette and smokes it on his way home.

"This law, as well as the one forbidding the sale of tobacco to minors under 16, is very wholesome in its tendency. Such laws, however, add new and grave responsibili-

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ties to the teacher's office. That some teachers fail to appreciate this is due simply to human nature. That others fail to appreciate the fact that precept is futile when not supported by practice is pitiable. On the whole, we believe the teachers in our schools are anxious to do their duty in observing this law. If parents, in many cases, were as watchful as the teachers, and as willing to make sacrifices, if necessary, in order that their children might be taught habits of soberness and temperance, the work of temperance instruction would be much more effective."—*Henry Sabin, Iowa State Superintendent.*

"The legislature of 1896 amended the act of 1895 providing for instruction 'in the nature of alcoholic drinks and other narcotics' for four lessons per week for ten weeks in each year, by reducing the amount of instruction to three lessons per week for ten weeks 'or its equivalent.' By this amendment, thirty lessons given during a school year comply with the requirements of the law. The State superintendent of public instruction is required by the act of 1896 to include in his annual report a statement showing every school, city or district, which has failed to comply with all the provisions of the act during the preceding school year. All reports made to this department by local officers contain affidavits showing that the law has been complied with. While difficulties have been found in complying with the strict letter of the statute, it is very evident that teachers and school officers throughout the State are cheerfully endeavoring to meet the spirit of the law. No complaint or appeal has reached the department that the law has been violated. It is gratifying to note that during the year much misunderstanding and misrepresentation have been removed, and it seems to be generally understood that the attitude of the department has never been antagonistic to instruction which teaches the importance of temperance as a personal virtue and a social benefit."—*Charles R. Skinner, New York State Superintendent.*

"This law was advocated especially to give an increased knowledge about the evil effects of alcoholic drinks, stimulants and narcotics on the human system. Since the passage of the act increased attention has been given to the teaching of the subject in all grades of the schools, as required, but it has failed to enlist that hearty interest on the part of either pupils or teachers to which it is entitled. This is owing to many circumstances which environ the subject. There are real friends of temperance who doubt the wisdom of directing the attention of young children to the structure and functions of their bodily organs; they question, too, the utility, if not the possibility, of making critical analyses of alcohol or of narcotics with young pupils, to show their effect upon the blood and nerves and tissues of the living human organism. They believe that the whole subject, in its more technical aspects, should be deferred until after the pupil has received some instruction in chemistry and kindred sciences and has attained considerable power of forming independent judgments through his own reflection. An effort to compel instruction to be given by means of text-books, and to have these used from the earliest grades, has met with opposition on pedagogical grounds; no subject, it is said, can be properly taught in this way.

"On the other hand, the advocates claim that no instruction would be received by the mass of the children leaving school at an early age if the study was deferred to an advanced grade, and that the teachers generally are not qualified to give instruction in this subject without text-books. There are real difficulties to be overcome, as there have

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been in teaching other branches. The remedy will be found in giving to all teachers proper professional training for teaching all branches and by inspiring them with the vital importance of this.

"By such means as have been brought to bear upon the teachers by the law compelling them to qualify themselves for the teaching, and upon the children by the kind of instruction hitherto given, there is a growing interest in it and an increase of knowledge which must be of lasting benefit to the coming generation. I believe the subject is really receiving as much attention in the schools as any subject ever receives in so brief a time as has elapsed since the passage of the compulsory law for teaching this branch." —*George A. Walton, in Massachusetts School Report.*

"There are some, but not many, exceptions to compliance with the provisions of this law in the letter. The spirit of the law is not always fulfilled as it might be.

"The child may be taught scientific facts about alcohol and narcotics and be no more helped thereby in his conduct in life than by the knowledge he has of scientific facts in geology. The aim should be to so teach him that he will desire to refrain from all injurious habits. Next, having the right desire, he must have the properly disciplined will power to execute his desires.

"We believe that the teachers as a rule do the best they can with the knowledge and appliances and conditions at their command to fulfil this law in letter and spirit. We urge, however, a greater effort on their part to inculcate the principles that will lead the child to a life of temperance and pure living. School directors might well supply needed aids in the line of literature for instruction on this subject."—*Emma F. Bates, North Dakota State Superintendent.*

"Physiology is now required by law to be taught in the schools of nearly all the States. As too frequently taught, it concerns itself about the chemical effects of certain substances upon various parts or processes of the body. Such a treatment of the subject is too abstruse for children in the schools; it goes beyond their knowledge and experience. They need to be taught the effects of green apples upon the stomach before they are taught the effects of alcohol upon the brain. We ought to learn wisdom from the concrete teaching of nature about eating green apples in her monitory pains. People mean well when they teach the evil effects of alcohol to little boys and girls who do not know what alcohol is. It would be better to teach these children the good effects of wholesome food and drink, and especially to teach them that the whole alimentary canal should be kept in healthy, regular, and daily movement throughout, and to teach this and all that relates to the necessary bodily functions with delicacy and propriety and without any squeamishness. Is any teacher too delicate, cultured and refined a lady or gentleman to give this instruction concerning the bodies of the children? Then let them be relegated o the land of spirits, to teach where the mortal coil has been shuffled off. It is high time to inaugurate a campaign of hygiene, and not the least important branch of child study is the study of their bodies, and how those bodies may be made in school to grow strong, robust, healthy, natural, at ease—'the temple of the living God.'"—*A. P. Marble in Report of Committee of Twelve.*

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V. CONTINUATION CLASSES.

Appendix G will show the Continuation Classes in existence for the academic year 1899-1900. The purpose of this class of schools is to give some of the advantages of secondary education to localities not provided with High Schools. The division between elementary and secondary education is after all an arbitrary one. Pupils who have no higher attainments than the Fourth Form of the Public Schools are poorly equipped in these days for the ordinary duties of life. It is a well recognized principle of our school law, that all children are entitled to free education to the limit of the Public School course. Beyond this limit, localities have discretionary power respecting the imposition of fees. Many of our High Schools are free to resident pupils; and in nearly all cases Public School Boards, having Continuation Classes, have preferred to admit pupils beyond the requirements of the Public School program without exacting fees. The course of study for the Continuation Classes is wisely made the same as that prescribed for the lower forms of High Schools. Although not so in name, the larger Continuation Classes, especially those in Grade A, are to all intents and purposes High Schools. In many localities the trustees have seen the wisdom of employing teachers holding University degrees, as well as the certificates obtained at the Normal College. The establishment of Continuation Classes has served to diffuse secondary education among the young people of most parts of the Province; indeed, wherever there is a graded school with three or four teachers, the advantages of a High School are assured. The present mode of distributing the Legislative grant to Continuation Classes meets with general favour. The former method of distributing a portion of the grant on the results of examinations, while serviceable as a tentative measure, was evidently open to serious objections. Now a school with the requisite attendance and teachers of the required qualifications receives payment if the work is satisfactorily performed, irrespective of the number of pupils who may pass at any examination. The amount which these schools will receive in future will, of course, depend on the liberality of the Legislature. The grants for 1900 were $100, $50, $25, and $15, for schools in Grades A, B, C and D respectively. The numbers in the different grades were: A, 50; B, 54; C, 125; D, 212. The County Council is required by the provisions of the statute to pay an equivalent to the School Boards. I believe the payments by Municipal Councils have been cheerfully made, and in some cases even beyond the minimum required by law.

In my report of last year I took the opportunity of pointing out the advantages of High schools to the community. It is satisfactory to know that there is a growing conviction that it would be a short-sighted policy to limit public expenditure for education to the elementary schools. Our High Schools are of great value in promoting the efficiency of the Public schools. Secondary Schools exert a powerful stimulus for good upon the schools below, just as the Universities have a marked effect upon the efficiency of the High Schools. Year by year it is becoming more apparent that the children who are poorly equipped mentally suffer serious disadvantages in the battles of life. When the pupils in the lower classes of our Public Schools have held before them the ideals of higher and broader scholarship, they will be influenced to do better work. This longing for higher things on the part of children should not be overlooked, but wisely guided. In the Public Schools where there is no wish on the part of pupils to advance to High

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Schools, there is lacking a laudable ambition. It has been said that "a system of education is like a pyramid, which should, all the way down, assume shape and proportions from the corner stone at the apex." Doubtless the elementary schools should receive first consideration, but unless the Province has efficient High Schools, the Public Schools must necessarily suffer. It is therefore gratifying to know that the demand for Continuation Classes, or High Schools, is strongly felt in all parts of the Province. It would be unfortunate if the benefits of secondary education were limited to the wealthier classes. When the resources of our country are arresting public attention all the world over, it would be a very short-sighted policy not to afford every opportunity for extending the benefits of education to all classes of the community.

"Much of the opposition to the High Schools has come from a misapprehension of their real character and work. It is commonly asserted that the High School's chief work is to fit pupils for college; that the studies pursued are mainly Latin and Greek, and that the results of the course do not in any real sense prepare a young man for life. It is a fact, however, that, while the best High Schools do fit pupils for college, and some others make an attempt, the great majority of scholars do not take the college preparatory course, but, instead, what may be termed an English and scientific course, the two distinct lines of work being literary and scientific. If anyone can conceive of any course of study which is better calculated to train young men or young women, and equip them with the tools with which to win places for themselves, I am sure the educators of the country would be more than glad to know of it. In a word, I claim for the training of our best High Schools, that it is the best equipment a young person can receive for the active duties of life, unless he can go further and add to his High School course a collegiate one.

"People do not hesitate to say that 'High School graduates do not know anything,' and they are always able to point to one and another whose success in life has been anything but brilliant; all of which is more than offset by the fact—to be established in any community large enough to offer a fair test—that nearly all the large business of the world—the enterprises that require breadth of knowledge, power of judgement, decision and capacity for execution—is in the hands of High School and College men. And the cause often times of the lack of success of the educated man is not in the character and extent of his intellectual training, but in the failure to develop the will, or directive power."—*Thomas B. Stockwell, Rhode Island State Commissioner of Public Schools.*

VI. EXAMINATIONS.

The subject of written examinations is one which has been very much considered in recent years. Discussions of their value have not been confined to this Province, but have taken place in every country where education has made progress. In the United States, in England, in Germany and in France the advantages and the disadvantages of written examinations are constantly recurring topics at teachers' conventions and in educational journals. Where there is so much difference of opinion among members of the profession respecting examination tendencies, it would be presumptious to offer dogmatic opinions. The statement may, however, be safely made that while the ablest educationists of the present day have recognized objections to examinations, they fully

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agree at the same time that there are educational benefits to be derived from tests of this kind if properly conducted. It is scarcely necessary to say that where written examinations are entirely discarded there is no good teaching. All good instruction calls for reproduction by the pupil, which must be both oral and written, and, therefore, not necessarily limited to the former. One may only mention the subjects of composition, arithmetic, Latin, etc., without being forced to acknowledge that to condemn all written examinations is to deny well-known pedagogical truths. The teacher who never examines his pupils in the subjects of instruction has little idea of their progress and is continually working at random. Whatever may be the evils associated with written examinations, it is evident that no good teacher would fall back on the system in vogue many years ago, when written examinations were rare occurrences. What is here said applies to the examinations held by the teacher himself—the purpose being solely a part of his work in the proper instruction of his pupils. Such examinations are intended to be educative and no outside examiner has anything to do with them.

Some regular method of promotions is required in graded schools and in any organized system of education. It is evident that the teacher himself should be the most competent person to determine what pupils are prepared to pass to a higher form. The tests may include a final examination, but the work during the school term should in most cases settle the question of a pupil's fitness for promotion. In some schools an examination in one or two subjects by the Principal or Inspector at the close of the term serves as a good safe-guard for both teacher and pupils. For obvious reasons uniform examinations have been prescribed by the Education Department for the admission of pupils to High Schools and Collegiate Institutes. Pupils are admitted from various elementary schools—Public, Separate and Private—to secondary schools, and, therefore, a prescribed curriculum and fixed time for the entrance examinations are necessary. The local Board of Examiners has, however, virtual control regarding the admission of pupils, including the power to meet special cases and the Education Department simply accepts the report without amendment. When students pass from the secondary schools to the Universities the step is really another promotion and it is evident that the Principal of the High School and his staff should know, better than any Board of Examiners, who are prepared to take up University work. All pupils do not, however, come from High Schools, and, in any case, matriculation examinations are taken by all students who desire to enter the University. For admission to Universities two methods have been found in different countries—the one by examination and the other by certificate. In the United States, admission by certificate is the rule in nearly all the Universities of the West, and most of those of the East, except Harvard, Yale, Columbia, and a few other large institutions, where admission by examination is imperative. There are very strong arguments in favor of each of these methods, and, while some American educationists are pronounced in favor of admission by certificate, others are equally decided in favor of admission by examination. Is it not possible to have the advantages of both systems in one? This has been the aim of the policy pursued in Ontario for some years, and it is not too much to say that the plan has been fairly successful. The system of having confidential reports from the schools was adopted some years ago by the Education Department; and the University authorities have taken advantage of these reports. The confidential reports serve all the purposes of certificates from the

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staff, and the extent to which these certificates are accepted is a matter resting exclusively with the Board of Examiners and the Educational Council.

However advantageous it would be to dispense with written examinations for entrance to the High Schools and the Universities, it would appear impossible to abandon such tests in determining the non-professional requirements for teachers' certificates. If the certificates for teachers are to be Provincial in character, there must be some regard to uniformity in standards and centralization in authority. At the same time the judgment of the staff should have great weight in all doubtful cases. With this object, the Regulations of the Education Department provide that any candidate who obtains the total number of marks required may be awarded a certificate, even though he should fail in one or more subjects, provided he is regarded by the teachers as fit to pass. Experience goes to show that it is not uncommon for a candidate to fail to do himself justice in a subject of the examination. This may arise through illness on the day ofthe examination, or from other causes. In such an event, the recommendation of the staff—made before the examination—is of great service. It is felt that the aggregate of marks obtained gives fair indication of the strength of the candidate, and that a few marks below the minimum in a subject should not stand in the way of the success of a candidate who has a high total and is recommended by the Principal. It is found that in recent years the confidential reports have saved many a deserving candidate and thus the system of passing by means of "report" or "certificate" has a rational place in the present system of written examinations. No doubt it would be possible to describe an ideal system where there would be no examination held by outside examiners. Present conditions have to determine the methods to be employed and no plan has yet been devised which would make it safe for the Education Department to do away with the non-professional examinations prescribed for teachers' certificates.

In an article written by Dr. Paulsen, Professor of Philosophy in the University of Berlin, the statement ismadethat "Examinations must not be multiplied beyond necessity." This general statement puts the matter plainly, but of course differences of opinion will arise regarding the necessity of various examinations. So far as promotion examinations are concerned, there does not appear any need for taking the matter out of the hands of the teachers, who are undoubtedly the best judges. It would be unwise to abandon the High School Entrance examinations, although the recommendations of teachers sent to the Board *before the examination* is held might very wisely have weight with examiners. Matriculation examinations are of course under the control of the Universities, and it is probable some modifications may be made before long. The division of the examination for Junior Leaving Standing into two parts, instead of into three as formerly, has undoubtedly been an advantage. It will be well to consider when the Regulations are next revised if it would not be beneficial to have only one examination for Junior Leaving Standing. Doubtless this would throw increased responsibility upon teachers but it is not too much to hope that an increase of responsibility would not lessen the teacher's influence for good. It would cause greater importance to be attached to independent methods of instruction, and give more freedom in the development of character. With our system of inspection, it should be an easy matter, as it is a desirable object, to attach increased importance to the teacher's ability in forming character. The teacher's influence in the school should be regarded as more important than the results obtained by

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written examinations. Under all the circumstances it would be wise to dispense with every written examination not absolutely necessary and to give teachers all possible freedom in adopting the most improved educational methods.

VII.—COMMERCIAL EDUCATION.

For many years provision has been made in the High and Public School courses of study for instruction in what concerns a business education. Too often there appears to be considerable misconception respecting the branches which should constitute a commercial education. It is sometimes thoughtlessly assumed that a knowledge of book-keeping is all that is necessary to fit a student for mercantile pursuits. It is scarcely necessary to point out that instruction in composition, geography, arithmetic, literature, etc., is essential to everyone engaged in the ordinary pursuits of life. Some elementary knowledge of book-keeping is important for everyone, irrespective of the calling in life that may be pursued. The farmer and the mechanic should have some knowledge of accounts, and, therefore, a course is prescribed for the Fifth Form of the Public Schools and the First Form of the High Schools, which should be taken up by all pupils. It would be a mistake to urge the one who intends to matriculate in the university, or to take up some profession, to omit the elementary commercial course prescribed. To meet the purposes of students who have in view some mercantile pursuit, an advanced course is prescribed. This embraces a somewhat extended knowledge of book-keeping and commercial transactions, a better acquaintance with elementary mathematics, English and geography, and a course in stenography, together with provision for typewriting, which has in recent years become so important in connection with business. A reference to the requirements given in the High School curriculum will readily show the objects of the two courses mentioned. It will avoid confusion if the difference in the purposes of the elementary and the advanced commercial courses are not overlooked. By reference to the statistical tables it will be seen that 10,625 pupils in the High Schools and Collegiate Institutes took up the commercial courses.

Considerable attention has been given in some countries within the last couple of years to the pressing needs of a higher training for the more complicated kinds of business. In a few cities of the United States commercial High Schools have been established, and departments for training in business have been opened in connection with colleges and universities. In Germany and France much attention has been given to this subject, and the question is arresting the thought of English educationists. Lord Rosebery in his inaugural address as Lord Rector of Glasgow University expresses himself in the following language :—

"Commerce, however, comes fairly within my limits as a bond of Empire, and affects our University, which stands aloft in such a teeming mart. Here, then, is, at any rate, ample opportunity for taking stock and considering methods. I cannot enter into the discussion whether there is cause for alarm as to the future of our trade; there is no time for that nor is this the place. But it may fairly be alleged that there are disquieting symptoms. Whether these symptoms be truthful indications or not, they are at any rate worthy of careful, incisive investigation. In some quarters such indications are never neglected. I am greatly struck by a passage in the report of the United States

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Consul at Chemnitz, cited in the pamphlet in which our University sets forth its requirements. 'If an industry in Germany languishes,' he says, 'immediately a commission inquires into the causes, and recommends remedial measures, among which usually is the advice to establish technical and industrial schools, devoted to the branch of business under consideration.' In a word, they go to the root, to the principle, to the source. This is thoroughness, this is the scientific method applied to manufacture, and we see its success. The Americans, I gather, have hitherto applied themselves rather less to the principles than the applications of science. I do not pretend to say which are right. The Germans are alarmed at the development of American commerce, and we are alarmed at both. At any rate, both in Germany and the United States you see an expenditure and a systematic devotion to commercial and technical and scientific training. I know that much is done, too, in Great Britain. But I doubt if even that is carried out in the same methodical way; nor is there anything like the same lavish, though well-considered expenditure. It always seems to me as if in Germany nothing, and in Great Britain everything is left to chance. Nothing but a miracle can stop us, think the Germans, when they have completed their preparations. We shall have our usual miracle, thinks the cheerful Briton, as he sets out a good deal in arrear. With the same intelligent persistence with which the German makes war, he has entered on the peaceful conflict of commerce, and therefore has achieved the same brilliant success. We need not envy that success, we do not grudge it; but it is well to observe it, and to note its causes.

"Commerce, then, is a bond of Empire, which this University by its training may do much to strengthen. The mercantile committee at Edinburgh demand, indeed, that to our Universities shall be added a commercial faculty which would stimulate the commercial side in our secondary schools, and which would be of substantial importance in attracting to the University men who are about to enter on a commercial life. 'They believe that a University education would be of the greater service to the men who are to occupy the chief positions in large commercial undertakings.' Our University has not as yet seen its way, where so much has to be done, to take this new and important step. It has done much, it is doing much, but it is well aware of its weakness. It is now appealing for aid to place itself on a properly scientific footing, a footing adequate to its position in this great commercial community, which so greatly needs and which can so fruitfully utilize opportunities of technical and scientific training. It will not, I think, appeal to the second city of the Empire in vain. But the newest of our Universities has advantages which are denied to the more ancient, with regard to modern requirements. For the practical purposes of the present day a University which starts in the 20th century has a great superiority over a University founded in the 15th; more especially when it is launched with keen intelligence of direction and ample funds, as is the new University of Birmingham. These practical Universities are the Universities of the future; for the average man, who has to work for his livelihood, cannot superadd the learning of the dead to the educational requirements of his life and his profession. There will always be Universities, or, at any rate, colleges, for the scholar, the teacher, and the divine; but year by year the ancient Universities will have to adapt themselves more and more to modern exigencies. And where so much has to be absolutely novel it is, perhaps, easier to begin than to remodel or adapt. So that the new Universities, which do not require for their utilitarian purposes hoary antiquity or ancient prescrip-

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tion, will have an advantage over the venerable schools which have for centuries guarded and interpreted and accumulated treasures of erudition.

"There was a time, long years ago, when the spheres of action and of learning were separate and distinct; when laymen dealt hard blows and left letters to the priesthood. That was to some extent the case when our oldest universities were founded. But the separation daily narrows, if it has not already disappeared. It has been said that the true university of our days is a collection of books. What if a future philosopher shall say that the best university is a workshop? And yet the latter definition bids fair to be the sounder of the two. The training of our schools and colleges must daily become more and more the training for action, for practical purpose. The question will be asked of the product of our educational system:—'Here is a young fellow of twenty; he has passed the best years of acquisition and impression; he has cost so much; what is his value? For what, in all the manifold activities of the world, is he fit?' and if the answer be not satisfactory, if the product be only a sort of learned mummy, the system will be condemned. Are there not thousands of lads to-day plodding away, or supposed to be plodding away at the ancient classics who will never make anything of these classics, and who, at the first possible moment will cast them into space, never to re-open them? Think of the wasted time that that implies; not all wasted, perhaps, for something may have been gained in power of application, but entirely wasted so far as available knowledge is concerned. And if you consider, as you will have to consider in the stress of competition, that the time and energy of her citizens is part of the capital of the commonwealth, all those wasted years represent a dead loss to the Empire. If then, these recent events and the present conditions of the world induce thinkers and leaders in this country to test our strength and methods for the great—but, I hope peaceful—struggle before us, they must reckon the training of man. On that, under Providence, depends the future, and the immediate future of the race; and what is Empire but the predominance of race?

"How is that predominance to be secured? Remember the conditions; nations all becoming more dense and numerous; and, therefore, more hungry and more difficult to satisfy; nations more and more alive to their substantial interests and capable of pursuing them; nations, therefore, increasingly aware of the vital necessity of a healthy, growing commerce, and fiercely determined to obtain it; nations more and more civilized, and, therefore, less and less anxious for the wager of battle, but still ready even for that, if it be necessary for their new objects. After all, when you have reduced all this to its last expression, it comes to this—the keener and more developed intelligence of humanity, stimulated by competition and enhanced by training. It is with that intelligence that we have to struggle and to vie. This conflict we have no reason to fear, if we choose to rouse ourselves. We have, I believe, the best natural material in the world. But I doubt if we are sufficiently alive to the exigencies of the situation."

On the growing importance of superior qualifications for business, President Eliot, of Harvard University—one of the leading educationionists of America—has the following valuable views:—

"The phrase 'commercial education is' likely to remind an American of the commercial course in a public high school or of the fictitious banks, offices and shops of the private school called a commercial college. The so-called commercial course in an American high school is almost universally a course hopelessly inferior to the other courses, being

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made up by substituting bookkeeping, stenography, typewriting, and commercial arithmetic for some of the language, history, mathematics, or science of the classical or English scientific course. This course exists in our public schools because it has for committeemen and parents a practical sound. It seems as if the child who had learned a little about these technical subjects might be better able to earn its living early than the child who had only studied languages, history, mathematics, and science. For the purposes of mental training or of mental power getting this course is never to be recommended, and it is rare that the slight knowledge of these arts acquired by pupils in the public schools proves to be of much use to them in winning a livelihood. The so-called commercial schools supplement for many young people a defective elementary education, but they seldom train anybody for service above that of a clerk. It is not of any such training that I propose to speak.

"I ask your attention for a few moments to the chief features of a commercial education capable of preparing men and women for much more than clerical service and much more than narrow retail trading. An indispensable element in the training I have in view is a sound secondary education—that is, an education in a first-rate school, public endowed, or private, which occupies the whole school time of the pupils from 13 or 14 to 18 years of age. This secondary education should include the modern languages, an essential part of a good preparation for the higher walks of business life. It may or may or may not include Latin, or Latin and Greek. Thus the German non-classical secondary education is a very substantial preparation for business life, although it includes no technical subjects whatever. It deals with modern languages, including the native tongue, the elementary mathematics, history and science, both pure and applied. For international commercial life in English-speaking countries a good knowledge of three languages beside English is desirable, namely, French, German and Spanish. A reading knowledge of the languages will ordinarily suffice for principals, but for travelling agents or agents resident abroad a speaking knowledge of at least two of these languages is desirable. This knowledge should be acquired at the secondary school.

"Let us imagine a boy equipped at 18 with these broad fundamental acquisitions, and let us then ask ourselves what additional subjects should be treated in an upper commercial school. The following list of subjects is by no means complete, but may serve to give a fair idea of the diversity and difficulty of the subjects appropraite to superior commercial education: Economics, statistics, banking, currency, exchange, arbitrage, insurance, Government tariffs, transportation by land and water, commercial geography, climates, ethnology, commercial products by region and by nationality or race, consump-by region and by race, maritime legislation, blockade rights, neutral's rights, commercial law, industrial combinations of capital, labor unions, and, if I may use a new but convenient word, financing new undertakings. Some of these subjects are already taught elaborately in universities, and the elements and general principles of all of them can be taught systematically to groups of pupils and enforced by examples and problems just as well as styles of architecture, rules of evidence in law, or the diagnostic value of blood examinations in medicine are now taught and enforced in special schools. That a given subject has practical applications and is to be really mastered only by much practice is no reason why it should not be taught systematically in its elements by teachers skilled in in expounding principles and guiding practice."

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VIII. Technical Education.

In my report of last year, attention was drawn to Manual Training. In 1899 this subject was made an optional part of the course for High and Public Schools. The results have warranted the addition of this modern department of educational work. Woodstock College has the honour of being the pioneer institution in Canada in the introduction of manual training. For several years the Toronto Technical School, maintained by the city council, has done a valuable work for a numerous class of citizens through its evening classes. Through the liberality of Sir William Macdonald, Professor Robertson, of Ottawa, has been instrumental in having schools for manual training opened at Brockville and Ottawa. Instructors in these schools receive $100 a month and desirable positions may in future be open for teachers who qualify themselves for this kind of work. The Toronto Public School Board has also availed itself of the liberality of Sir William Macdonald, and manual training, it is expected, will soon be introduced into several of the Public schools of the city. The Board of Education, Kingston, has with commendable enterprise equipped a room for manual training, and appointed a qualified instructor. A similar beginning has been made by the Brantford Technical School Board; and there are indications that classes for manual training, and perhaps for technical education, may before long be organized in several other towns and cities of Ontario.

Domestic Science, which was also made an optional subject of the Public School course in 1899, is receiving considerable attention. The organization and equipment of the Normal School of Domestic Science at Hamilton will afford excellent opportunities for enabling young women to prepare to teach this subject. Much credit is due to the enterprise of Mrs. Hoodless in the establishment of this school; and her lectures on Domestic Science have served to create considerable enthusiasm in the subject. In Toronto the liberality of Mrs. Massey-Treble has shown itself in the equipment of an institution (The Fred Victor Mission), which for some departments of domestic science will compare most favourably with many institutions in the United States. Domestic Science is also taught in connection with the Young Women's Christian Association and the Young Women's Christian Guild, Toronto. It is not too much to expect that ere long Public School Boards in many of our cities will make provision for instruction in Domestic Science.

It would be folly to ignore the progress of science, and to adhere to the curriculum prescribed a half century ago. In every part of the civilized world there has been a revolution in the industries of life. Manual training, domestic science and technical education have been warmly advocated as necessary additions to the work of school and college. As might be expected, the objects to be gained are not definitely fixed in the minds of many persons. A great many have the impression that the main purpose is to obtain for the artisan such instruction in handicraft as may fit him for the special employment of his life, so that he may become a skilled, rather than unskilled, workman. People often say, and with much truth, that the material prosperity of a country depends largely on the knowledge and skill of the working classes, and that the tendency has been to give too little attention to the sciences which are closely identified with manual industry. It is claimed, and with much force, that if our country is to obtain a better place in the labour market and a larger share of the trade and manufacturers of the world, technical

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instruction must form a prominent part of the course prescribed for our Public and High Schools. It is also held that the pupils of our schools should obtain such knowledge of the properties of the substances to be handled, and such facility in the use of tools as would make them readier for any form of mechanical industry to which their attention might be directed. A great many advocates of manual training urge in addition that in all our systems of general education, too much attention is paid to the memory, the judgment and the purely intellectual faculties, while the discipline of hand and eye and of the bodily powers generally has been too often ignored. There are other advocates of industrial education who object to giving large attention to the intellectual training of the humbler classes. They object to any efforts on the part of the municipality or the Legislature, which would educate, as they say, "people beyond their calling in life." They are willing to expend money for education, but wish the masses of the people to remain "hewers of wood and drawers of water." They think the education of the artisan should not be too ambitious, and occasionally they speak of the danger of "over-education." It is satisfactory to know that very few in this country are actuated by views of this kind, and a very small number of those who hold such opinions seldom avow this sort of reasoning. If manual training tended to debar the farmer or the mechanic from entering other walks of life, its addition to the course of study could not in this democratic age be defended.

Regardless of the theories or motives which may influence persons in advocating the introduction of manual training, it will be well for everyone to look at the industrial and commercial side of the problem, and to consider how our material wealth may be increased by adopting manual training as a part of our school courses. It should be kept in mind that the conditions of industrial life are wholly changed from what they were, even twenty years ago. The concentration of manufactures, the increased use of machinery, the constant divisions of labor, and the keenness of modern competition, have to be dealt with. The old conception of apprenticeship is past. Intelligence and good training on the part of workmen are needed as much as ever. Skill must therefore be sought in some way. It would be discreditable for the mechanic to handle every day materials and not to understand their qualities, or to employ tools, machines and forces of whose character he has made no investigation. Every occupation, however humble, has a science underlying it. The intelligent mechanic is trained to think for himself. The unskilled one becomes a mere machine. For the acquisition of knowledge, and for the right manipulation of tools, persons at the present day must look to the schools and technical institutes for what was formerly secured by the apprentice system. Those who are to become leaders or foremen in mechanical movements will doubtless take advantage of the Toronto School of Practical Science. The remarks of the Principal, found in another part of this report, will show the valuable work done by this School. This institution, with a moderate expenditure, serves purposes like those of the Massachusetts Institute of Technology in Boston, and similar institutions in several other large cities.

From an educational point of view, manual training or technical instruction has a value apart from its industrial advantages. It would be a mistake to specialize in our Public Schools, and, indeed, it is feared by many that specialization is begun too early by High School students. Dr. James MacAlister, Principal of Drexel Institute, Philadelphia, who was for several years superintendent of the public schools of that city, puts the case

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clearly: "The object of the public school is education in its broadest sense. If industrial training cannot be shewn to be education in this sense, it has no place in the public school. We have no more right to teach carpentry and bookbinding than we have to teach law and medicine. The supreme end of education is the harmonious development of all the powers of a human being. Whatever ministers to this end is education; whatever interferes with its accomplishment, no matter how valuable it is, lies outside of the province of the school." In any discussion regarding courses of study, I think this aspect should be kept constantly in view by teachers. Manual training has undoubtedly an economic advantage, but if this is its only purpose, it is questionable whether it is deserving of a place in our school curriculum. The true end of education should, therefore, be kept constantly in view. If education is "the preparation for complete living," the educative advantage of a subject, or an institution, cannot be sacrificed to any presumed economic claims. Our High and Public School courses are not intended for different classes of pupils. The education obtained in the public school, as well as that obtained in the high school, should be complete in itself; and the main difference between the function of the high school and that of the public school should be that the former gives a better preparation for life's purposes. Regarding the end of education, the remarks of the President of Bowdoin College are quite to the point. They are as follows:

"The end of education is to know and get what is best in the world, and to give our best work in exchange.

"The four stages of education are elementary, secondary, higher, and professional. The end of education is not something which is to be attained only at the conclusion of the fourth stage. It is something which can be attained to a certain degree at the end of each stage, and may be attained more completely at the end of the first or second than it often is at the end of the third or fourth. There are many bachelors of arts and doctors of philosophy who, tested by our definition, are much farther from the end of education than many a graduate of the district or grammar school.

"Each stage of education should be complete in itself. Elementary education should be directed exclusively or chiefly to the needs of children who will leave school forever at the age of thirteen or fourteen. The great majority of children cannot remain in school beyond that age. The problem of elementary education, therefore, is to prepare these children, who are to be workingmen and workingwomen, to know the best in the world and to get their share of it, and to give their best through their work in exchange. Now, what is to be the nature of their work? It is chiefly the production of material things. Hence, since so much of their life will deal with material objects, the manipulation of these objects by hand and eye is one of the first elements of training which these children who are to be workers should receive.

"In the simple agricultural life of our fathers many boys and girls got this training on the farm, where there were plenty of chores to do, animals and plants to tend, tools to make and mend and use. Next to the farm in educating power comes the seashore, with its perpetual battle with fickle and treacherous elements. The increasing concentration of population in the cities is raising up a generation of children who have in their home life no means of acquiring the rough discipline with plough and hoe against a stubborn soil, or with oar and sail and rudder against a threatening sea. The city, cut off from field, forest, stream and sea, tends to breed a race of mental dwarfs and moral cripples.

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Living in a ready-made world, in which there is little or nothing left for them to do they come to school with flabby minds as well as flabby muscles, with undeveloped wills as the counterpart of unused hands. The city has its compensation. In many respects the city boy gets the start of his country cousin. But in the fundamental quality of getting the most out of life, and giving his best back to it, the country boy is at a great advantage. I suppose that is one reason why the most successful men in the business and professional life of the cities themselves are almost invariably country-born and bred.

"The problem of the city school is how to stem this tide; how to put its children on a level with their country cousins, and save them from the degeneration which threatens them. Now the old curriculum, well enough in its way as a supplement to the real training which the farmer's children got in the field and the barn and the shed and the shop, is utterly inadequate to do the work required to make the city boy get the best there is in the world, and give the best there is in him. For with its reading of detached sentences from printed pages, its writing in imitation of the copy, its mechanical memorizing of the fixed boundaries of geography, and its history recited by rote from a single and ultimate text-book; it was as artificial, mechanical, ready-made an affair as the uniform tenements and paved streets from which the mass of the city children came.

"The kindergarten has come as the first great gospel of salvation to the city child. The kindergarten teaches the child, as nothing else at that stage can, the great lesson of how to get the best the world has for him, and to give his own best in return. The kindergarten stage, however, must not be unduly prolonged. Its value lies in appeal to involuntary attention at a time when involuntary attention is the child's whole stock in trade. By the time a child is six or seven at the latest he should be well started on the road to voluntary attention to unwelcome tasks. To prolong the exclusive kindergarten idea much beyond that age is to weaken and debilitate the will and to leave the last stage of the kindergarten product worse than the first. This is a mistake to which our public school system is not addicted; but it is the cardinal defect of a certain class of private schools which cater to the children of the rich. When the pampered prodigies produced by the elongated kindergartens enter the secondary school, their flabby wills and atrophied mental muscles make a sorry showing in comparison with the sturdier youth who have half a dozen years or more of discipline in doing hard and even disagreeable intellectual work. The best friends of the kindergarten are those who limit it strictly to its proper sphere, within which it is incomparable.

"The true continuation of the kindergarten is not found in the devices for making history and geography amusing, but in manual training, which trains hand and eye to delight in doing hard physical work well. and making material objects useful and beautiful. Manual training brings out steadiness, persistence, patience, precision, thoroughness; virtues which real book-learning seldom imparts, but on which its excellence depends. The great majority of school and college graduates who have had neither industrial nor artistic training manifest an impatience in the presence of petty obstacles, an irritability at delay and discouragement, a disinclination to the drudgery of which every useful life must be full. Manual training, with its severe standards of neatness, accuracy, form, and finish, with its progress to more and more obstinate material, should follow the kindergarten, and give to the city youth such equivalent as it can for chores and jobs, the tasks

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and risks of the young farmer, hunter, forester, and fisherman. It gives dignity to the work which the great majority of these children must do in after life. Sewing and cooking and household acts for girls are equally essential, if they are to grow up into anything better than anaemic, incompetent, superfluous competitors for a bare subsistence in half a dozen overcrowded lines of genteel employment."—*W. De Witt Hyde, President of Bowdoin College.*

The question will arise, where manual training should begin. This point is, however, actually settled, for in the kindergarten is laid the foundation of this kind of training. For obvious reasons the kindergarten cannot well be introduced into rural schools. It is not necessary, however, for children in the country have certain training advantages which the kindergarten is intended to give in cities. The knowledge also which pupils in the rural schools obtain all through life regarding labour appliances gives them an admirable beginning in all that relates to agriculture and mechanical pursuits. Sewing might well be taught in most rural schools, which are now generally in control of female teachers. The young ladies attending our Normal Schools now take an elementary course in this department, as well as in cooking and sanitation; and there is no reason why some time could not be devoted to sewing especially, as well as to grammar or arithmetic. It is perhaps only by the force of tradition that such elementary portions of domestic science are not taken up for all girls in the public schools, both in urban and rural schools. Respecting sewing, the remarks of Sir Joshua Fitch are quite appropriate regarding the character of the needle-work which should engage the attention of girls at school. They are as follows:

"We have at hand some more recent experience illustrating the same truth. There has been for many years in our elementary schools one kind of manual and technical work especially subsidized by the State, and indeed enforced as an indispensable condition of receiving any aid or recognition from the Education Department at all. I mean needlework in girls' schools. It fulfils for girls all the conditions which the advocates of technical instruction have in view for boys. It has unquestionable utility. It affords training for eye and hand. It demands attention, accuracy, and dexterity; and it has an economic value, as one of the means by which the home may be improved and money earned. It enlists a good deal of sympathy among managers, and the Lady Bountiful or the vicar's wife in a country village is often well content to see the half of every school day spent, not indeed in learning to sew, but in manufacturing garments for home use or for sale. It is thought by many good people to be the most appropriate of all school exercises for girls. It looks so domestic, so feminine, so practical. Perhaps it may seem ungracious to enquire too curiously into the effect of this kind of exersise upon the general capacity of the scholars and upon the formation of their characters. But as a matter of fact, the exercise is often dull and mechanical; it keeps children dawdling for hours over the production of results which, with more skilful and intelligent teaching, might be produced in one-fourth of the time. The place in which the work is done becomes rather a factory than a school, and measures its usefulness rather by the number of garments it can finish than by the number of bright, handy, and intelligent scholars it can turn out. In fact, it is found that proficiency in needle-work may co-exist with complete intellectual stagnation, and that the general cultivation of the children, their interest in reading and enquiring has been too often sacrificed to the desire for vis-

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ible and material results. Some of the sewing is designated with curious irony, *fancy* work. But there is little or no room in it for fancy or inventiveness, or even for the exercise of any originality or taste. So while fully conceding the importance of needlework as an integral part of the primary education of the girls in our schools, I think we are all interested in economizing the time devoted to this work, in seeking to employ better methods of obtaining results, and above all in remembering that the educational value of mere handiwork is in itself very limited, and that it ought to be supplemented by other discipline if we desire to make the best of our material and to send into the world capable and thoughtful women, ready for the varied duties of domestic and industrial life."

Manual training is deserving of a place in all public schools in our towns and cities, and especially in the latter. The tendency of the population in all civilized countries towards the cities, makes it important for the children in urban municipalities to have the advantages which the country affords respecting a knowledge of nature, the character of materials and the use of tools. In the United States, although manual training was first largely confined to high schools, it was felt that its benefits would extend to a small number unless the subject became a part of the elementary school course. Manual training should, therefore, in Ontario become a continuation of much of the work done in the kindergarten. All through the public school course, certain hours each week should be devoted to this kind of work. It is not necessary here to outline a course of study. This will be a matter for future consideration on the part of educationists; and the courses of study adopted in other countries will be of much service in framing a programme.

It would be a mistake to defer manual training until pupils have entered the High School. It would also be a mistake to conclude that manual training should have no place in High School programmes. The majority of pupils who attend High Schools, attend these institutions to get a better training than is furnished in the Public Schools. The secondary schools are not supported simply for those who enter the professions. This view is now generally accepted and its acceptance settles the question of the position of manual training. However, for pupils who intend to follow professions, or to enter the university, the benefits of manual training should not be ignored. In the United States manual training has a prominent place in courses of study in most city high schools. On this question the opinion of the superintendent of Baltimore schools is not out of place :—

"Ten years ago manual training in the high school was an open question, and its desirability still a matter of debate. Now its cost is considered as legitimate an item of public expense as that of any of the traditional subjects. Some of the questions with regard to high-school manual training now are : What shall be taught? For how long a time? How freely shall it be offered (that is, in every school or only in special schools)? Shall it extend to the teaching of trades?

"Not only on account of its value in general development is it highly desirable that all pupils should have manual training through the elementary grades; but, as long as the tendency to differentiate high schools prevails, it is also essential to bring all pupils in the elementary schools into contact with the greatest possible variety of activities, including that which manual training furnishes, so that by the time they are ready for the high school they may know in what direction their tastes lie. Otherwise

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the choice will depend upon proximity to the school, rather than upon tastes and aptitudes.

"As the means of general development manual training should be one of the subjects offered in every high school. Experience proves that even classical pupils will gladly devote from two to four periods a week to this work in excess of the regular requirements. They are the better for it, physically as well as mentally. I have not attempted to say what modifications, if any, should be made in courses of well-equipped manual-training high schools, but only to show what may be done in an ordinary high school. The course here outlined assumes that the boys have already had bench-work in wood, and that the girls have taken sewing or cooking, or both, but have not had bench-work. These they are to take before they begin carving. The course should not exceed four periods per week, and should be on the same basis as other unprepared subjects. Drawing is not mentioned, as it is presumed already to form an important part of the work of the school. It must, of course, precede every kind of work mentioned in the outline."—*James H. Van Sickle, Superintendent of Schools, Baltimore.*

"The ten years since 1886 have been years of great educational activity. The Royal Commission on Technical Instruction had presented its report to Parliament two years previously, and the recommendations contained in it were beginning to lay hold upon the public mind. In giving practical shape to the conclusions at which we had arrived after inspecting the schools of other countries and inquiring into their influence upon the manufacturing industries which they have been designed to promote, and after making ourselves thoroughly acquainted with the educational organizations of this country and their effects upon the occupations of the people, we made certain modest recommendations which at the time were considered by many educational enthusiasts to be altogether inadequate to meet the requirements of the times. We were of opinion, however, that it was better to ask for a little, with a chance of getting it, than to ask for much and have the favour refused. At that time the subject of drawing, which an education minister had graphically described as 'the mainspring of the technical education of the artisan,' was not taught to more than one in four of the scholars in elementary schools, and that often so badly as hardly to be worthy of the name of instruction. Elementary science fared even worse than drawing. Modeling was almost unknown; manual instruction had scarcely been heard of—the pen was the only industrial weapon that boys intended for skilled handicraftsmen were taught to use—and domestic subjects for girls, excepting needlework, had not come within the range of practical education. The local authorities, however much they might have desired it, had no power to appropriate any of the ratepayers' money toward the development of the brains of the ratepayers in the way of providing technical instruction or contributing to technical schools.

"The recommendations of the commissioners dealt with the above and many other deficiencies, and it is very satisfactory that several of them have been adopted. Drawing is now taught to all boys, and usually with the aid of suitable casts and examples; modeling has been introduced in many localities; school museums have been established, and elementary science is now extensively taught with, in some instances, laboratory practice. Manual instruction is being given in the most progressive schools, and in agri-

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cultural districts the facts of agriculture are being taught, to which has been added the use of tools, with practical instruction in garden plants. In addition to drawing and needlework, the elements of cookery and household management are being taught extensively to girls. The above subjects influence the prospective life work of the scholars and prepare them on becoming apprentices to take up in the evening classes the special subjects of science and art which have a bearing on their daily occupation.

"It has been said by the critics and those candid friends who are ever ready to throw cold water on this movement, that the value of technical education first comes in with those 'who emerge from the class of manual workers,' the directors of labor, the foreman or those who work more with their brains than with their hands; and that while it may be prudent to spend public money on the training of the talented, it is a waste of money and of effort to attempt any widespread diffusion of technical education among the ordinary workmen. But our critics have never pointed to any method whereby the few may be selected from the mass. The sifting process must begin among the young, and it is not revealed to us when we see the children at the school, or even the apprentices at the workshop, how to distinguish those who will be the future brain workers or foremen. Professor Huxley said it was worth spending a million to discover a Faraday, and so to find the specially capable we must give facilities to all who will come. It must also be noted that it is not usual to find the foreman or even the adult workman in the class room. By the time that he has risen to a leading position he is no longer a student. In my own experience—going back many years—of the organization of evening classes in my own town that have been attended by thousands of artisans, I find that in the engineering shops, the building trades, factories, and large industrial establishments, the foremen, draughtsmen, brain-workers, and many employers now in middle life began their career as apprentices in the lower ranks of labour. But nearly the whole of these industrial leaders passed through the evening classes of the Keighley Institute, ten, twenty, or even more years ago, and if the technical classes in those days had only been open to foremen and brain workers they would have been excluded. The students of to-day are youths and young men, most of whom are probably ordinary apprentices and workmen, but I have not the slightest hesitation in saying that from their ranks the future brain-workers, foremen, and employers in their various industries will rise, and those who may be destined to remain in the rank and file of the industrial army will be all the better as men for the wider cultivation and refinement which they obtained through their studies and reading."—*S. Smith, Member of the British Commission on Technical Education.*

Respecting the German system of technical education the following opinions of the principal of an English school are worth quoting :—

"Initially, the real and ultimate aim of true technical education should be set forth. The air just now is full of wild ideas about the general elevation of mankind, the approach of a sort of intellectual millenium, the appropriation of the commerce of the world, and numberless other topics of a similar character, but all of which are being paraded by so-called educationists as coming within the scope of a technical education. The proper test of technical education should be its commercial value, but there is considerable danger of that value being greatly overestimated. Attention is naturally directed to Germany, where such education has attained its, at present, highest development, and the prominent positions which Germans have in recent years acquired in the commercial world has caused many to assume that that position is due entirely to the system of education. The equalizing effects of the telegraph, of railways, and generally

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of increased facilities for transport and correspondence are of course ignored. It is, however, more than questionable whether, if the German system of education had been applied in any other continental country, similar commercial progress would have resulted. The main causes of Germany's progress are to be found in the general industry of her sons, in the determination with which they pursue their objects, in the low rate of wages for which her workmen are content to labor, in the low profits which the masters are content to receive, in the general sense of discipline inspired by her military system, in the greater relative power of capital as compared with labor, in the influence of a fostering government, in their general business capabilities, and last, but not least, in the way in which they utilize their technically trained men."

IX. Patriotism.

The last year has been a notable one in the history of the British Empire. The events which have transpired in South Africa have brought the attention of our people to those interests felt wherever the British flag floats. The spirit of loyalty and devotion to the nation has been evinced by the alacrity with which Canadians have undertaken their share in the maintenance of Imperial institutions. The love of Canadians for British institutions has been tested in a manner, which it is hoped may not soon be required again. More recently the death of our beloved Queen has caused all our people to prize more than ever the advantages resulting from her long and beneficient reign. It would be out of place here to enlarge upon the advances which civilization has made during the Victorian era. It would be in order, however, if necessary, to allude to the marvellous progress made in education during the last sixty-four years of British history. It is especially gratifying that in all matters pertaining to the intellectual, and especially to the moral, improvement of the race, the late reign will ever be a memorable one in the annals of British history. The words of Charles Dudley Warner, who says that "a great nation is made only by worthy citizens," should be remembered by the youth of our country. It would be extremely fitting to perpetuate in our schools the memory of Queen Victoria, by having Empire Day always duly celebrated hereafter. Already it has been of value in directing the attention of the pupils of our schools to the magnificent heritage left to the rising generation. If children are frequently reminded of what constitutes the chief glory of the Empire, their love for British institutions will continue to be cultivated, and their desires to become worthy citizens will be intensified. The noblest aim of education should be to teach the young how to make the best of life. Good citizenship stands inseparably connected with the family, and it should be a main purpose of the school to promote those high moral principles which are inseparable from the best home training. Unless the pupils attending our schools are obedient to parents and teachers, all efforts to promote patriotism will have little avail. Every child attending our schools should be actuated by the highest spirit of patriotism, but it should never be forgotten that by having well ordered homes, and well disciplined schools, the prospects of good citizenship are best assured. The Anglo-Saxon race has been distinguished from its historic beginnings for its love of personal liberty, and it is under British institutions that the blessings of personal liberty may be realized in its highest and best sense. If the young men trained in our schools become examples of sobriety, industry, honesty and fidelity to principle, we may expect to have a population able to cope with those difficulties which so often beset the national weal. The home, together with the school, is the birthplace of true patriotism; and true patriotism is the most import-

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ant characteristic for the up-building of any nation. Canadians need not be advised to love their country. Their admiration for British rule has more than once been tested. It should not be forgotten, however, that love of country, to be a real help and safeguard, must be a sentiment high enough to be moral in range and quality. The teachers of our schools may well remind their pupils that the truest and most useful citizens are those who invigorate and lift the nation by doing whatever duty devolves upon them, truthfully and manfully. Canada may well take a hopeful view of the future if a genuine love of religion and truth permeates the training given to the rising generation. With such a spirit may the reign of the new King be entered upon by all the pupils of our schools. In this way the highest patriotism may be manifested, and that person may be regarded as the best patriot who seeks to aid in all movements that look to the instruction, the elevation and the permanent betterment of all our citizens.

X. Conclusion.

In the foregoing remarks I have referred to a few of the topics that have, within the last year, engaged the attention of the Education Department. It is unnecessary to add that there are other subjects which are also pressing for consideration. Among them I deem the most important that of promoting the higher status of the teacher. All the provisions respecting courses of study have less significance in the interest of the schools than the best means of providing a class of teachers eminently qualified for their duties. The organization of the Ontario Normal College has enabled the province to secure High School teachers who are probably academically and professionally as well qualified as the teachers of secondary schools in any other country. The main difficulty regarding the question as it pertains to Public Schools, is the short time which the average teacher remains in the profession. Young men of ability can scarcely be expected to continue teaching unless higher salaries are paid. In Ontario, as in most places on this continent, the majority of teachers of elementary schools are women. For obvious reasons, the teaching profession, so far as concerns public schools, is, therefore, lacking in permanency. The abolition of the Primary examination was doubtless a step in the right direction. With the higher qualifications required, the large surplus of teachers noticed a few years ago has disappeared; indeed, in a few parts of the Province a scarcity of Public School teachers has arisen. The excellence of the training which is given to Public School teachers is well recognized. The advantages of lengthening the term of the Normal Schools, as well as that of the County Model Schools, have long been apparent. Several related questions have, however, to be carefully considered before changes of this kind are made. It would be desirable if the holders of Third Class certificates could be limited to certain schools; and the better positions open only to those who hold higher grades of certificates. If a change were made regarding the distribution of the legislative and municipal grants. so as to give greater inducements to trustees for engaging Second or First Class teachers, something might be accomplished. A change of this kind can only be secured if supported by public opinion. The opening of the third Normal School (London) has not done all that is to be desired in meeting present needs. If the Province were in a position to erect another one all four could readily be filled with students.

Some modifications of the present course of study for High and Public Schools, as well as for teachers' certificates, will doubtless be necessary before long. It is hoped that

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after 1902 a course of study may be prescribed which will be warranted by the experience gained during the last few years. In this connection attention is directed to the report of Inspector Seath who, at my request, visited several of the schools in the United States; and his opinions regarding Manual Training, Domestic Science and modifications of the courses of study for schools, will warrant careful examination. I hope a careful perusal will also be made of the reports from the University and the School of Practical Science.

I have the honour to be,
Your Honour's obedient servant,
RICHARD HARCOURT,
Minister of Education.

Education Department,
Toronto, February, 1901.

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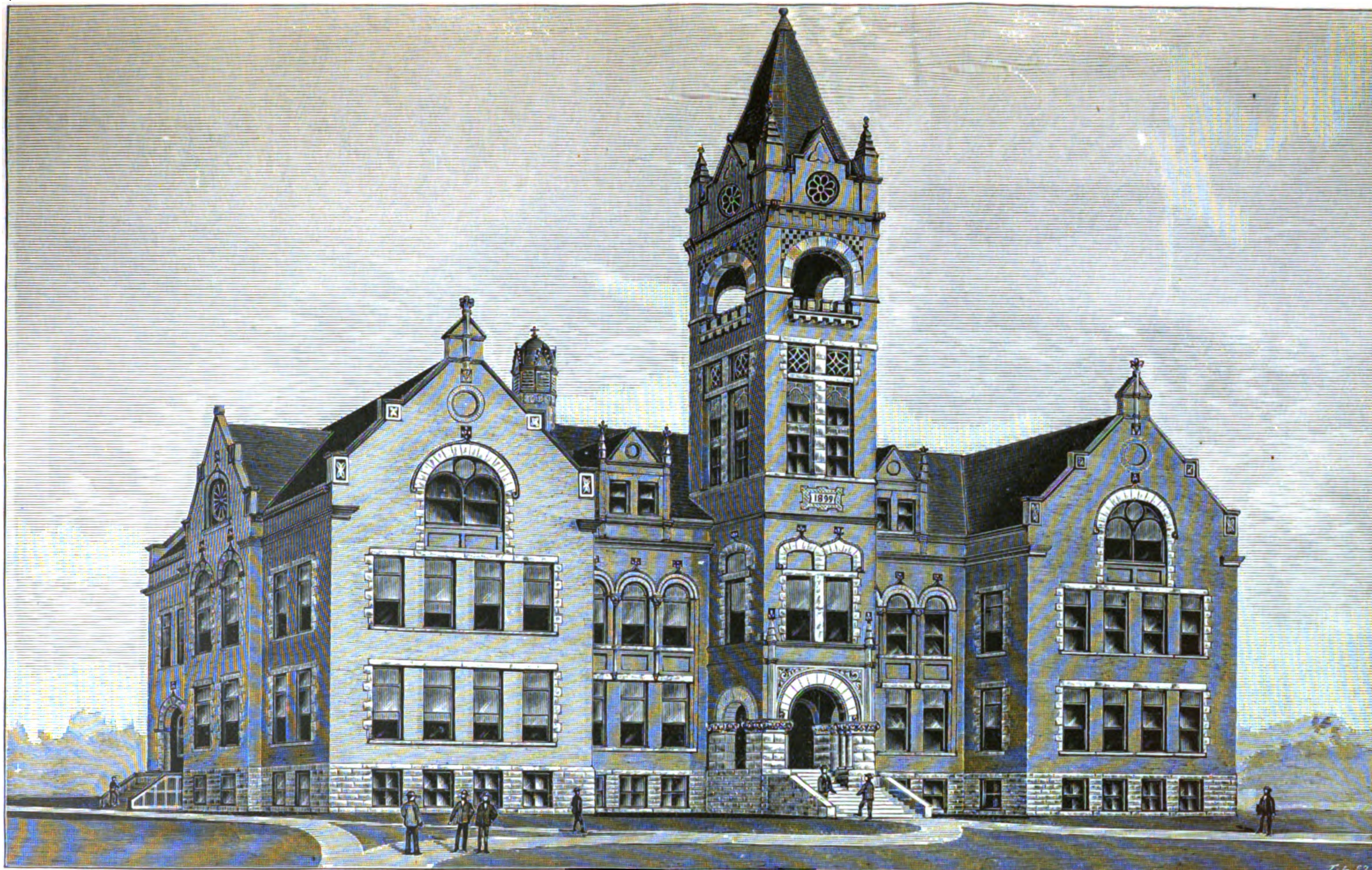

London Provincial Normal School.

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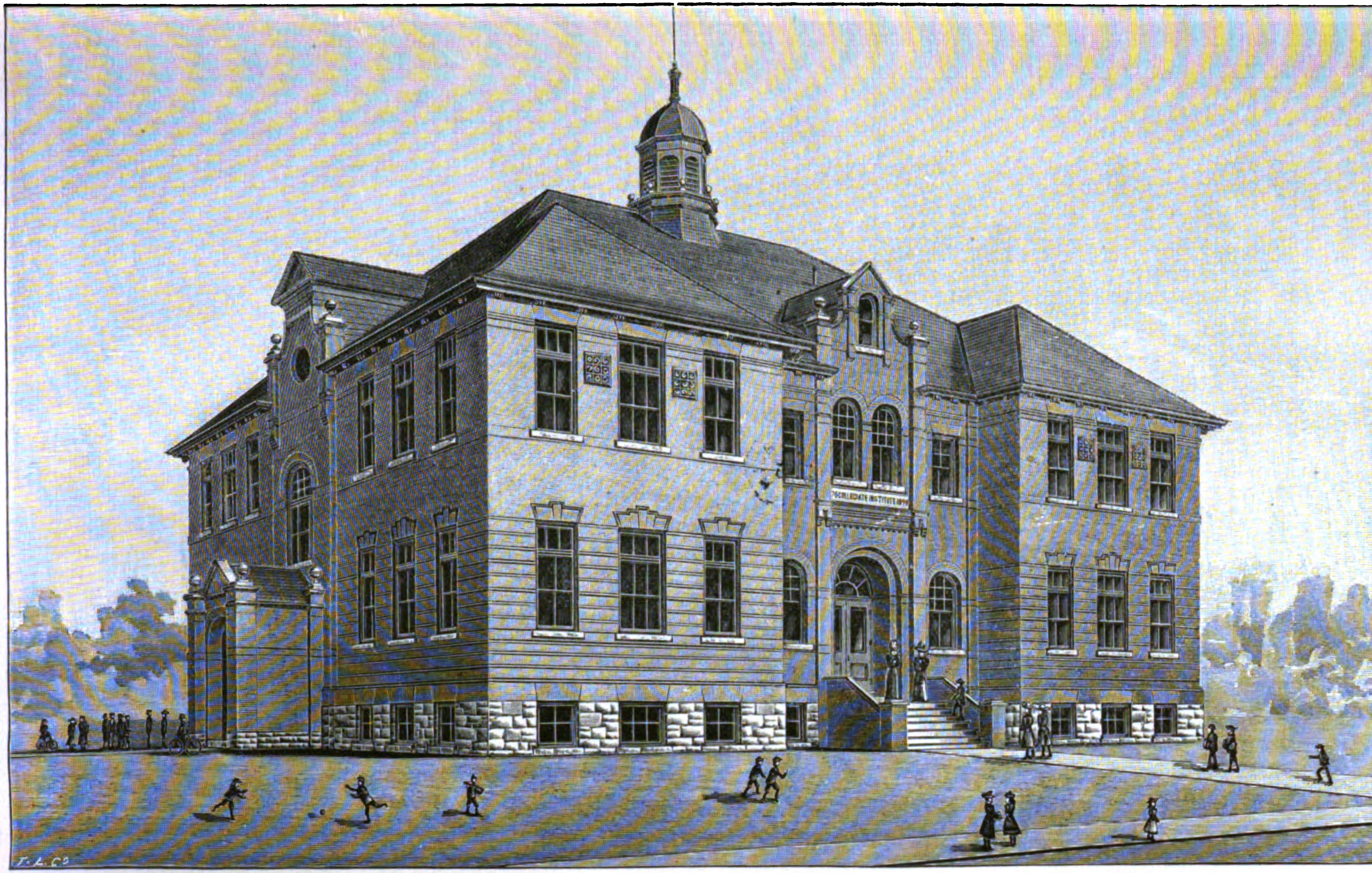

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APPENDICES.

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APPENEIX A.

STATISTICAL TABLES.

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I.—TABLE A.—The

Counties. (Including incorporated villages but not cities or towns.)	School population.—Pupils: School population between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age.	Total number of pupils of all ages attending school.	Boys.	Girls.
1 Brant	4,417	7	3,304	.....	3,311	1,750	1,561
2 Bruce	14,425	22	11,691	5	11,718	6,208	5,510
3 Carleton	9,264	20	6,899	7	6,926	3,697	3,229
4 Dundas	5,570	43	4,629	2	4,674	2,412	2,262
5 Dufferin	5,121	25	4,879	4	4,908	2,611	2,297
6 Durham	5,520	15	4,938	2	4,955	2,575	2,380
7 Elgin	7,900	28	6,630	2	6,660	3,452	3,208
8 Essex	11,488	26	8,664	4	8,694	4,476	4,218
9 Frontenac	6,581	47	5,717	2	5,766	3,015	2,751
10 Glengarry	5,181	17	4,160	1	4,178	2,217	1,961
11 Grey	15,726	109	13,951	11	14,071	7,308	6,763
12 Haldimand	5,678	29	4,635	1	4,665	2,490	2,175
13 Haliburton, N. E. Muskoka, S. Nipissing & E. Parry Sound.	6,865	61	5,449	5	5,515	2,866	2,649
14 Halton	5,038	.....	3,684	.....	3,684	1,908	1,776
15 Hastings	11,519	36	9,208	4	9,248	4,782	4,466
16 Huron	15,639	14	11,595	5	11,614	6,086	5,528
17 Kent	10,613	34	8,902	3	8,939	4,687	4,252
18 Lambton	12,215	31	10,001	3	10,035	5,206	4,829
19 Lanark	6,265	18	4,600	2	4,620	2,354	2,266
20 Leeds and Grenville	11,043	46	9,523	5	9,574	4,903	4,671
21 Lennox and Addington	5,401	33	4,786	1	4,820	2,493	2,327
22 Lincoln	5,214	15	3,983	.....	3,998	2,091	1,907
23 Middlesex	12,434	16	9,973	3	9,992	5,225	4,767
24 Norfolk	8,796	35	6,359	2	6,396	3,361	3,035
25 Northumberland	8,308	10	6,295	1	6,306	3,279	3,027
26 Ontario	8,817	24	7,504	.....	7,528	4,055	3,473
27 Oxford	9,650	2	7,433	1	7,436	3,816	3,620
28 Peel	5,555	2	4,312	3	4,317	2,287	2,030
29 Perth	9,298	26	6,989	2	7,017	3,786	3,231
30 Peterborough	7,469	21	5,563	2	5,586	2,906	2,680
31 Prescott and Russell	11,364	35	5,703	1	5,739	2,965	2,774
32 Prince Edward	3,354	18	3,059	3	3,080	1,553	1,527
33 Renfrew	11,195	61	7,813	6	7,880	4,015	3,865
34 Simcoe and W. Muskoka	18,011	48	16,158	7	16,213	8,557	7,656
35 Stormont	5,426	51	4,238	1	4,290	2,265	2,025
36 Victoria and S. E. Muskoka	8,218	33	7,263	3	7,299	4,013	3,286
37 Waterloo	9,511	6	7,048	2	7,056	3,806	3,250
38 Welland	6,293	29	5,374	.....	5,403	2,793	2,610
39 Wellington	13,995	20	8,630	3	8,653	4,610	4,043
40 Wentworth	6,998	2	5,194	1	5,197	2,751	2,446
41 York	14,164	33	11,872	4	11,909	6,413	5,496
42 District of Algoma	7,383	32	6,119	9	6,160	3,131	3,029
43 " N. Nipissing	2,134	18	1,940	.....	1,958	1,005	953
44 " W. Parry Sound	2,368	17	2,230	.....	2,247	1,133	1,114
45 Moose Fort	66	1	60	.....	61	21	40
Total	377,490	1,216	298,957	123	300,296	157,333	142,963
Cities.							
1 Belleville	2,603	.....	1,489	.....	1,489	740	749
2 Brantford	2,972	.....	2,651	.....	2,651	1,361	1,290
3 Chatham	2,391	.....	1,624	.....	1,624	796	828
4 Guelph	3,309	.....	1,749	1	1,750	882	868
5 Hamilton	13,450	1	8,785	2	8,788	4,443	4,345
6 Kingston	5,780	.....	2,590	.....	2,590	1,269	1,321
7 London	10,045	.....	6,150	.....	6,150	3,134	3,016
8 Ottawa	16,807	.....	5,076	.....	5,076	2,696	2,380
9 St. Catharines	2,810	.....	1,528	.....	1,528	756	772
10 St. Thomas	4,827	.....	2,177	.....	2,177	1,082	1,095
11 Stratford	2,907	.....	1,568	.....	1,568	796	772
12 Toronto	50,918	16	29,865	4	29,885	14,998	14,887
13 Windsor	3,378	1	2,234	.....	2,235	1,162	1,073
Total	121,697	18	67,486	7	67,511	34,115	33,396

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attending the public schools.

	Attending less than 20 days during the year.	20 to 50 days.	51 to 100 days.	101 to 150 days.	151 to 200 days.	201 to the whole year.	Number of children 8 to 14 (inclusive) who did not attend any school during the year.	Number of children 8 to 14 (inclusive) who did not attend any school for 100 days during the year.	Average attendance of pupils.	Percentage of average to total attendance.
1	240	411	638	776	1,112	134	2	454	1,886	57
2	974	1,483	2,392	2,921	3,687	261	53	1,962	6,094	52
3	670	1,067	1,592	1,676	1,848	73	77	1,803	3,379	49
4	432	526	919	1,143	1,599	55	17	813	2,549	55
5	622	911	1,215	1,237	879	54	21	1,156	2,242	46
6	461	674	1,090	1,198	1,364	168	59	786	2,590	52
7	454	749	1,374	1,527	2,333	223	22	801	3,743	56
8	856	1,366	2,132	2,251	2,035	54	338	2,218	4,081	47
9	863	997	1,429	1,266	1,112	99	57	1,368	2,508	43
10	493	652	1,046	1,049	900	38	31	1,186	1,925	46
11	1,460	2,194	3,184	3,514	3,461	308	210	2,636	6,219	44
12	263	518	789	1,182	1,697	266	42	578	2,930	63
13	849	1,140	1,435	1,141	889	61	36	1,839	2,261	41
14	240	477	739	991	1,192	45	7	509	2 003	54
15	959	1,410	1,924	2,272	2,520	163	65	2,047	4,729	51
16	688	1,392	2,132	3,017	4,172	313	32	1,517	6,744	58
17	872	1,297	1,882	2,121	2,588	179	31	1,764	4,504	50
18	793	1,228	1,300	2,434	3,539	141	40	1,926	5 457	54
19	391	588	945	1,161	1,427	108	27	850	2,445	53
20	984	1,470	2,053	2,229	2,586	252	60	1,938	4,841	51
21	614	805	1.038	1,085	1,208	75	62	1,285	2,244	47
22	838	543	796	953	1,805	63	8	811	2,204	55
23	679	1,158	1,828	2,694	3,491	142	27	1,749	5,658	57
24	659	999	1,288	1,494	1,769	187	10	1,049	3,195	50
25	530	849	1,211	1,578	1,954	189	26	1,097	3,302	52
26	576	1.047	1,591	1,919	2,234	161	21	1,145	3,956	53
27	525	902	1,361	1,780	2,563	305	2	962	4,282	58
28	315	649	929	1,135	1,241	38	....	670	2,115	49
29	443	802	1,439	1,812	2,317	174	14	872	3,858	55
30	495	774	1,316	1,889	1,529	83	48	1,104	2,861	51
31	668	892	1,490	1.330	1,286	73	102	1,822	2,665	46
32	272	486	557	774	889	102	12	453	1,607	52
33	925	1,320	1,989	1,899	1,613	134	....	1,808	3,621	45
34	1,329	2,619	3,852	3,844	3,898	671	87	2,899	7,950	49
35	451	649	903	1,075	1,123	89	5	839	2,105	49
36	873	1,228	1,805	1,697	1,550	146	4	540	3,536	48
37	268	649	1,232	1,587	3,073	247	11	1,030	4,431	63
38	389	755	1,198	1,310	1,625	126	13	793	2,843	53
39	576	1,078	1,746	2,404	2,739	110	27	1,436	4,727	55
40	354	664	1,179	1 303	1,591	106	2	820	2,756	53
41	932	1,575	2,716	2,934	3,555	197	22	1,794	6,397	54
42	965	1,107	1,544	1,321	1,125	98	120	1,632	2,664	43
43	290	324	417	421	479	27	29	442	775	40
44	340	513	584	381	396	83	26	726	878	39
45	5	15	21	20	....	....	1	41	41	67
	27,375	42,852	64,800	73,180	85,518	6,571	1,906	56,005	153,700	51
1	59	151	280	317	682	....	....	105	906	61
2	77	185	473	564	1,352	....	....	374	1,909	72
3	71	151	247	358	797	....	....	409	1,083	67
4	31	92	250	305	1,072	....	....	....	1,260	72
5	171	500	1,229	1,451	5,437	....	....	....	6,078	69
6	36	148	296	501	1,609	....	....	....	1,989	77
7	180	403	890	1,332	3,345	....	....	574	4,219	69
8	167	429	934	1,017	2,529	....	....	733	3,452	68
9	64	124	273	302	765	....	....	66	1,006	66
10	49	125	337	445	1,221	....	....	30	1,597	73
11	36	93	252	269	918	....	....	145	1,127	72
12	882	1,793	4,480	4,955	17,775	....	....	....	23,538	79
13	119	154	334	410	1,218	....	....	296	1,646	74
	1,942	4,348	10.275	12.226	38,720	....	....	2,732	49,810	74

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I.—TABLE A.—The

Towns.	School Population.—Pupils: School population between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age.	Total number of pupils attending school.	Boys.	Girls.
1 Alliston	875	....	353	......	353	168	185
2 Almonte	977	....	400	1	401	210	191
3 Amherstburg	612	....	285	......	285	157	128
4 Arnprior	884	....	577	......	577	293	284
5 Aurora	445	....	332	......	332	176	156
6 Aylmer	543	....	449	......	449	220	229
7 Barrie	1,308	....	1,286	......	1,286	656	627
8 Berlin	2,869	....	1,411	......	1,411	744	667
9 Blenheim	561	....	444	......	444	229	215
10 Bothwell	241	....	210	......	210	108	102
11 Bowmanville	694	....	513	......	513	251	262
12 Bracebridge	876	....	871	......	871	430	441
13 Brampton	611	....	539	......	539	297	242
14 Brockville	2,872	....	1,849	......	1,349	693	656
15 Carleton Place	1,309	....	870	......	870	430	440
16 Clinton	526	....	510	......	510	270	240
17 Cobourg	1,179	....	599	......	599	301	298
18 Collingwood	1,790	....	1,281	......	1,281	650	631
19 Cornwall	1,105	2	644	......	646	320	326
20 Deseronto	1,112	....	657	......	657	333	324
21 Dresden	473	....	426	......	426	201	225
22 Dundas	821	....	572	1	573	315	258
23 Durham	420	....	395	......	395	205	190
24 Essex	412	....	363	......	363	181	182
25 Forest	454	1	328	......	329	165	164
26 Fort William	871	....	764	......	764	380	384
27 Galt	1,789	....	1,456	......	1,456	755	701
28 Gananoque	1,116	....	739	......	739	403	336
29 Goderich	1.109	....	711	......	711	359	352
30 Gore Bay	*733	....	269	4	273	120	153
31 Gravenhurst	*763	1	755	......	756	394	362
32 Harriston	491	1	372	......	373	199	174
33 Hawkesbury	700	1	128	......	129	67	62
34 Ingersoll	1,229	....	825	......	825	394	431
35 Kincardine	628	....	471	......	471	228	243
36 Leamington	558	....	531	......	531	256	275
37 Lindsay	1,455	....	1,083	......	1,083	560	523
38 Listowel	*851	....	647	......	647	336	311
39 Little Current	193	....	166	......	166	77	89
40 Mattawa	472	....	111	......	111	48	63
41 Meaford	534	....	388	......	388	206	182
42 Midland	*800	....	698	......	698	346	352
43 Milton	445	....	367	......	367	176	191
44 Mitchell	*671	....	429	......	429	214	215
45 Mount Forest	508	....	482	......	482	283	199
46 Napanee	779	....	652	......	652	329	323
47 Newmarket	466	....	400	......	400	195	205
48 Niagara	*340	....	284	......	284	145	139
49 Niagara Falls	*840	....	639	......	639	324	315
50 North Bay	696	....	441	1	442	212	230
51 North Toronto	*600	....	472	......	472	224	248
52 Oakville	430	....	328	......	328	166	162
53 Orangeville	593	....	524	......	524	234	290
54 Orillia	1,581	....	1,081	......	1,081	528	553
55 Oshawa	1,163	....	779	......	779	368	411
56 Owen Sound	1,895	....	1,409	......	1,409	695	714
57 Palmerston	586	....	453	......	453	226	227
58 Parkhill	480	....	270	......	270	141	129
59 Paris	944	....	580	......	580	309	271
60 Parry Sound	1,021	....	699	......	699	364	335
61 Pembroke	*1,156	....	655	......	655	342	313

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Public Schools.

attending the Public School.

	Attending less than 20 days during the year.	20 to 50 days.	51 to 100 days.	101 to 150 days.	151 to 200 days.	201 days to the whole year.	No. of children 8 to 14 (inclusive) who did not attend any school during the year.	No. of children 8 to 14 (inc.) who did not attend any school for 100 days during the year.	Average attendance of pupils.	Percentage of average to total attendance.
1	24	29	82	88	185	....	....	65	227	64
2	13	30	77	104	177	....	....	31	259	65
3	17	25	65	50	128	....	....	40	170	60
4	21	41	81	114	320	....	....	65	407	71
5	15	25	62	72	158	....	....	49	215	65
6	13	38	75	95	228	....	....	75	302	67
7	64	142	264	252	564	....	....	178	764	59
8	14	50	125	243	979	....	....	185	1,054	75
9	24	35	75	100	210	....	....	44	277	62
10	11	26	55	42	76	....	....	36	125	60
11	11	17	63	118	309	....	....	44	364	71
12	56	183	392	226	64	....	....	264	401	46
13	15	41	74	118	291	....	....	40	362	67
14	37	90	186	286	750	....	....	129	935	69
15	23	61	160	258	868	....	....	43	556	64
16	8	46	63	118	275	....	....	10	350	69
17	21	51	93	145	289	....	....	31	389	65
18	72	129	234	351	494	1	....	250	799	62
19	34	37	118	148	309	....	....	78	422	65
20	17	31	96	146	367	....	....	44	464	71
21	26	33	75	62	228	2	12	54	284	67
22	14	32	74	112	341	....	....	42	446	78
23	15	28	51	88	213	....	....	41	263	67
24	12	42	68	90	151	....	....	65	220	61
25	6	25	55	69	174	....	....	40	226	69
26	58	82	146	184	294	....	....	....	444	58
27	34	74	199	282	867	....	....	136	1,043	72
28	34	58	96	147	404	....	....	51	507	69
29	14	85	94	160	408	....	....	....	515	72
30	30	33	100	64	46	....	....	28	126	46
31	58	112	271	195	120	....	....	....	342	45
32	16	25	61	104	167	....	....	46	232	62
33	7	14	26	32	50	....	....	14	80	62
34	30	73	142	174	406	....	....	163	535	65
35	13	33	80	162	183	....	....	....	298	68
36	21	44	82	138	251	....	....	61	361	68
37	28	58	145	212	640	....	....	62	785	72
38	29	56	99	131	332	....	....	85	434	67
39	15	20	45	35	51	....	4	20	84	51
40	5	21	16	22	47	....	....	15	63	57
41	22	21	77	102	166	....	....	50	241	62
42	47	77	170	144	260	....	....	176	398	57
43	7	21	55	65	219	....	....	26	258	70
44	12	31	67	104	218	2	....	24	279	65
45	14	32	75	110	251	....	....	95	328	68
46	34	55	121	142	300	....	....	29	420	64
47	18	31	73	90	188	....	....	27	248	62
48	25	42	84	86	47	....	....	32	185	48
49	25	39	96	137	342	....	....	87	461	72
50	39	40	110	117	136	....	....	158	264	57
51	29	50	96	117	180	....	....	104	273	58
52	13	23	54	68	170	....	....	29	220	67
53	22	39	97	131	285	....	....	77	316	60
54	37	78	198	251	517	....	2	84	745	69
55	22	54	144	156	403	....	....	141	515	67
56	56	98	192	290	756	17	6	62	978	69
57	13	40	63	104	233	....	....	16	301	66
58	7	20	40	62	141	....	....	....	179	66
59	19	42	101	175	[illegible]	11	....	....	375	65
60	63	57	150	160	[illegible]	....	....	102	420	60
61	18	35	99	165	[illegible]	2	....	64	458	69

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I.—TABLE A.—The

Towns.—*Con.*	School Population.—Pupils: School population between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age.	Total number of pupils of all ages attending school.	Boys.	Girls.
62 Penetanguishene	752	....	345	......	345	169	176
63 Perth	1,037	....	574	......	574	284	290
64 Peterborough	2,731	....	1,690	......	1,690	847	843
65 Petrolea	1,211	....	1,036	......	1,036	520	516
66 Picton	868	2	626	......	628	321	307
67 Port Arthur	758	....	493	......	493	251	242
68 Port Hope	1,050	....	843	......	843	412	431
69 Prescott	443	....	404	......	404	194	210
70 Preston	657	....	372	......	372	198	174
71 Rat Portage	*1,081	....	1,023	......	1,023	556	467
72 Renfrew	940	....	478	......	478	235	243
73 Ridgetown	*665	....	500	......	500	256	244
74 Sandwich	487	....	325	......	325	152	173
75 Sarnia	2,181	2	1,381	......	1,383	690	693
76 Sault St. Marie	940	....	749	......	749	394	355
77 Seaforth	694	....	431	......	431	223	208
78 Simcoe	667	....	504	......	504	277	227
79 Smith's Falls	1,350	....	1,015	......	1,015	506	509
80 Stayner	*374	....	315	......	315	151	164
81 Sturgeon Falls	323	1	124	......	125	72	53
82 St. Mary's	907	....	805	......	805	397	408
83 Strathroy	717	....	563	......	563	282	281
84 Sudbury	225	....	219	......	219	103	116
85 Thessalon	*262	....	220	......	220	112	108
86 Thornbury	249	....	202	......	202	108	94
87 Thorold	611	....	346	......	346	180	166
88 Tilsonburg	632	....	443	......	443	220	223
89 Toronto Junction	1,780	....	1,674	......	1,674	865	809
90 Trenton	1,110	....	663	......	663	339	324
91 Uxbridge	*724	....	408	......	408	198	210
92 Vankleek Hill	600	....	205	......	205	105	100
93 Walkerton	828	....	523	......	523	255	268
94 Walkerville	320	....	254	......	254	128	126
95 Wallaceburg	903	....	627	3	630	322	308
96 Waterloo	928	....	641	......	641	319	322
97 Welland	409	1	408	......	409	215	194
98 Whitby	*802	....	443	......	443	240	203
99 Wiarton	593	....	561	......	561	291	270
100 Wingham	669	....	510	......	510	248	262
101 Woodstock	1,800	....	1,733	......	1,733	874	859
Total	87,163	12	61,398	10	61,420	31,118	30,302
Totals.							
1 Counties, etc.	377,490	1,216	298,957	123	300,296	157,333	142,963
2 Cities	121,697	18	67,486	7	67,511	34,115	33,396
3 Towns	87,163	12	61,398	10	61,420	31,118	30,302
4 Grand total, 1899	586,350	1,246	427,841	140	429,227	222,566	206,661
5 Grand total, 1898	591,300	1,297	435,227	203	436,727	227,361	209,366
6 Increase	....	..	....	......	....	....	....
7 Decrease	4,950	51	7,386	63	7,500	4,795	2,705
Percentage	....	.29	99.68	.03	....	51.8	48.2

* Statistics of annual report of preceding year. NOTE.—In addition, there

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Public Schools.

...ttending the Public Schools.

	Attending less than 20 days during the year.	20 to 50 days.	51 to 100 days.	101 to 150 days.	151 to 200 days.	201 days to the whole year.	No. of children (8 to 14 inc.) who did not attend any school during the year.	No. of children (8 to 14 inc.) who did not attend any school for 100 days during the year.	Average attendance of pupils.
62	39	45	72	76	113	....	....	87	198
63	16	36	94	171	257	....	....	67	375
64	60	87	224	327	992	....	....	159	1,222
65	40	80	171	192	553	....	....	55	649
66	18	55	109	172	283	....	....	90	399
67	29	37	84	109	225	9	....	35	317
68	12	43	92	175	521	....	....	58	625
69	22	35	68	87	192	....	....	49	261
70	9	27	58	66	212	....	....	37	259
71	63	102	231	215	412	....	....	195	610
72	28	48	74	107	226	....	....	56	297
73	23	30	75	100	272	....	....	65	338
74	29	43	85	82	86	....	....	25	162
75	69	123	214	285	692	....	....	165	879
76	56	105	152	140	296	....	....	137	438
77	22	28	51	102	228	....	....	48	293
78	10	48	98	117	231	....	2	57	323
79	40	77	174	203	521	....	....	159	691
80	21	39	49	88	118	....	....	....	194
81	16	21	30	32	26	....	....	18	59
82	[illegible]	79	325	266	108	....	....	48	393
83	[illegible]	81	74	134	311	....	....	21	398
84	[illegible]	31	50	61	64	....	3	31	136
85	[illegible]	33	47	76	47	....	....	....	120
86	[illegible]	23	37	44	85	....	....	32	124
87	[illegible]	28	54	80	170	....	....	19	203
88	[illegible]	37	85	91	212	....	....	91	272
89	[illegible]	215	355	378	625	....	....	310	916
90	[illegible]	56	117	154	294	....	....	140	395
91	[illegible]	36	71	97	184	....	....	....	277
92	[illegible]	20	25	22	132	....	....	51	146
93	[illegible]	25	58	117	314	7	3	37	375
94	[illegible]	15	48	47	137	....	....	16	174
95	[illegible]	50	126	137	290	....	....	36	395
96	[illegible]	33	77	116	400	....	....	33	473
97	17	31	61	57	243	....	....	59	257
98	27	42	93	103	183	1	....	....	273
99	31	52	103	128	247	....	....	66	339
100	25	40	80	101	264	....	....	79	310
101	44	105	220	90	1,274	....	....	93	1,258
	2,622	4,986	10,819	13,443	29,498	52	32	6,677	39,815
1	27,375	42,852	64,800	73,180	85,518	6,571	1,906	56,005	153,700
2	1,942	4,348	10,275	12,226	38,720	....	....	2,732	49 810
3	2,622	4,986	10,819	13,443	29,498	52	32	6,677	39,815
4	31,939	52,186	85,894	98,849	153,786	6,623	1,938	65,414	243,325
5	31,864	53,778	86,379	97,212	156,809	10,685	2,565	67,070	247,780
6	75	....	....	1,637	....	....	....	....	....
7	....	1,592	485	....	3,073	4,062	627	1,656	4,455
	7.5	12	20	23	36	1.5	....	....	....

...were 11,262 Kindergarten pupils and 1,026 Night School pupils.

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II.—TABLE B.—

Counties. (Including incorporated villages, but not cities or towns.	Number of pupils in the								
	Reading.						Writing.	Arithmetic.	Drawing.
	1st Reader, Part I.	1st Reader, Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.			
1 Brant	576	429	704	768	641	190	3,311	3,311	3,311
2 Bruce	1,773	1,854	2 255	2,768	2,982	286	11,477	11,559	11,335
3 Carleton	1,571	905	1,431	1,378	1,294	357	6,539	6,704	6,280
4 Dundas	1,232	740	899	813	763	227	4,605	4,634	4,461
5 Dufferin	1,190	691	841	960	977	249	4,808	4,614	4,550
6 Durham	891	734	1,105	1,101	855	269	4,955	4,9[illegible]	4,955
7 Elgin	1,335	916	1,306	1,161	1,850	592	6,568	6,594	6,519
8 Essex	2,517	1,603	1,776	1,450	1,126	192	8,840	8,867	8,229
9 Frontenac	1,390	826	1,018	1,131	1,263	138	5,624	5,656	5,483
10 Glengarry	1,227	629	946	635	634	107	4,178	4,178	4,110
11 Grey	3,304	2,190	3,032	3,019	1,992	534	13,558	13,686	13,313
12 Haldimand	921	669	876	891	1,107	201	4,587	4,633	4,224
13 Haliburton, N.E. Muskoka, S. Nipissing, and E. Parry Sound.	1,674	944	1,093	977	653	174	5,204	5,307	4,183
14 Halton	783	560	632	721	749	239	3,684	3,684	3,684
15 Hastings	2,455	1,667	1,924	1,638	1,227	337	8,988	9,084	8,792
16 Huron	1,852	1,484	2,256	2 542	2,593	887	11,216	11,430	11,034
17 Kent	2,149	1,392	1,754	1,601	1,507	546	8,708	8,796	8,620
18 Lambton	2,412	1,791	1,75[illegible]	1,828	1,740	511	9,711	9,904	9,739
19 Lanark	1,124	768	873	953	724	178	4,620	4,620	4,620
20 Leeds and Grenville	2,094	1,320	1,772	1,899	2,102	387	9,211	9,064	7,234
21 Lennox & Addington	1,021	670	799	1,051	1,096	183	4,820	4,820	4,779
22 Lincoln	800	579	657	877	995	90	3,801	3,934	3,682
23 Middlesex	1,780	1,421	1,737	2,125	2,330	599	9,867	9,907	9,877
24 Norfolk	1,396	881	1,236	1,151	1,475	257	6,152	6,231	6,027
25 Northumberland	1,197	823	1,3[illegible]	1,396	1,292	265	6,141	6,228	5 924
26 Ontario	1,418	1,071	1,269	1,674	1,699	397	7,113	7,292	6,926
27 Oxford	1,489	1,061	1,327	1,445	1,592	522	8,320	7,414	7,016
28 Peel	854	653	770	952	824	264	4,289	4,312	4,185
29 Perth	1,313	972	1,080	1,862	1,373	417	6,693	6,894	5,809
30 Peterborough	1,322	815	1,079	1,160	1,048	162	5,510	5,462	4,937
31 Prescott and Russell	1,915	954	1,021	954	717	178	5,554	5,702	5,375
32 Prince Edward	491	350	483	612	872	272	3,057	3,065	2,005
33 Renfrew	2,190	1,221	1,454	1,499	1,219	347	7,650	7,7[illegible]5	6,262
34 Simcoe & W. Muskoka	3,800	2,619	3,094	3,096	2,679	925	15,523	15,789	15,297
35 Stormont	1,070	657	1,034	732	658	139	4,290	4,181	3,871
36 Victoria & S E Musk'ka	1,521	1,130	1,449	1,519	1,333	317	7,094	7,252	7,010
37 Waterloo	1,397	1,160	1,789	1,570	943	197	6,716	6,863	6,615
38 Welland	1,169	749	873	1,119	1,161	332	5,376	5,402	5,277
39 Wellington	1,724	1,283	1,497	1,811	1,902	436	8,415	8,575	8,117
40 Wentworth	977	671	896	1,284	1,092	277	5,063	5,125	5 071
41 York	2,700	1,779	2,201	2,539	2,253	417	11,689	11,752	11,275
42 District Algoma	1,748	1,036	1,224	1,168	863	131	5,713	5,887	5,535
43 " N. Nipissing	720	354	392	271	177	44	1 664	1,745	1,224
44 " W Parry S'nd.	708	373	414	444	266	42	1,934	2,051	1,778
45 Moose Fort	10	7	9	10	18	7	56	51	21
Total	67,230	45,191	57,353	60,515	56,159	13,848	292 451	294,549	279,571
Cities.									
1 Belleville	349	195	247	339	359	....	1,489	1,489	1,489
2 Brantford	575	341	404	801	530	....	2,651	2,651	2,651
3 Chatham	353	285	366	328	292	....	1,624	1,624	1,624
4 Guelph	340	236	235	458	349	132	1,750	1,745	1,689
5 Hamilton	2,065	1,175	1,242	2,272	1,559	475	8,187	8,788	8,788
6 Kingston	592	370	310	624	594	....	2,590	2,590	2,590
7 London	1,200	993	1,282	1,278	1,397	.....	6,150	6,150	6 150
8 Ottawa	1,251	620	686	1,249	1,040	220	5,076	5,076	5,076
9 St. Catharines	387	293	223	393	232	....	1 528	1,528	1,528
10 St. Thomas	601	269	394	481	432	....	2,177	2,177	2,177
11 Stratford	295	232	261	383	397	.....	1,568	1,568	1,568
12 Toronto	5,360	3,522	6,920	6,649	5,243	2,191	29,885	29,885	29.635
13 Windsor	703	507	477	324	224	....	2,235	2,235	2,235
Total	14,071	9,048	13,077	15,649	12,648	3,018	66,860	67,506	67,200

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The Public Schools.

different branches of instruction.

	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.
1	3,311	1,287	2,323	834	1,603	1,166	1,764	178	178	173	90	88	516
2	7,389	6,697	6,886	2,831	4,918	6,483	5,581	515	501	500	244	137	1,256
3	4,403	2,101	4,261	1,611	2,450	1,961	1,863	289	363	380	99	18	843
4	3,596	2,531	3,012	1,213	1,364	1,605	2 955	215	217	213	61	48	637
5	3,089	2,727	3,036	1,493	2,007	2,176	3,061	246	237	234	58	98	716
6	3,417	1,090	3,171	948	1,255	1,150	1,437	229	218	206	44	44	521
7	5,200	3,211	4,945	2,023	3,002	3,805	4,145	544	529	529	278	130	1,515
8	5,130	3,067	4,810	1,575	2,734	6,173	4,349	281	169	117	81	14	769
9	3 637	2,014	3,108	1,547	2,106	1,847	2,818	131	104	102	68	1	490
10	2,721	932	2,343	766	913	874	918	111	106	106	26	......	258
11	9,747	6,291	9,005	2,730	5,336	3,630	6,912	658	510	518	163	79	1,946
12	3,609	2,320	3,163	1,478	1,756	1,689	2,811	229	181	169	149	104	1,078
13	2,533	1,810	2,374	1,283	1,717	1,720	1,207	165	196	126	61	31	359
14	2,574	1,071	2,332	1,010	1,563	1,558	1,818	229	218	216	19	5	652
15	5,405	4,193	5,297	1,561	2,990	4,613	5,459	1,081	274	269	105	82	931
16	8,958	5,314	7,715	3,341	5,439	4,125	4,408	881	833	815	219	148	2,831
17	5,203	4,698	5,581	2,195	2,772	3,557	4 569	563	580	524	163	64	1,772
18	6,261	4,836	6,559	2,346	3,936	4,875	4,999	490	477	477	132	133	1,871
19	2,935	766	2,568	1,067	1,508	1,184	2,329	221	168	169	62	58	443
20	5,176	4,903	4,090	4,392	3,449	3,292	977	393	384	166	18	914	411
21	3,389	1,267	3,103	1,912	2,074	2,607	2,366	285	119	113	24	8	1,055
22	2,878	1,196	2,527	1,212	1,518	1,461	1,829	124	79	58	1	1	784
23	7,538	6,108	6,757	3,273	4,047	5,427	5,443	566	520	525	46	68	2,672
24	4,439	3,734	3,722	1,760	2,164	2,380	3,537	262	242	233	56	84	1,463
25	4,814	2,450	4,173	1,868	1,798	2,023	2,276	350	232	236	29	8	556
26	4,809	2,861	4,571	2,145	2,640	2,445	2,418	381	351	334	46	18	1,280
27	5,214	2,809	4,801	2,159	3,041	2,925	2,792	530	491	439	216	115	1,182
28	3,143	2,048	2,727	1,285	1,947	1,8?7	2,714	273	273	273	77	88	604
29	4,433	4,717	4,035	1,812	2,514	1,819	4,606	241	239	239	98	2	1,337
30	4,133	1,692	3,655	1,381	1,969	2,084	2,254	176	138	135	117	67	679
31	3,089	1,540	2,929	1,028	1,552	1,766	3,357	226	183	177	22	14	490
32	2,498	1,021	2,379	1,204	1,330	1,790	1,558	277	235	224	102	57	740
33	4,177	1,280	3,865	1,729	2,288	2,163	1,378	350	319	313	25	49	435
34	10,327	6,731	9,792	4,134	6,210	5,555	10,186	1,121	931	899	180	210	2,512
35	2,924	1,072	2,573	848	945	1,402	1,490	165	134	134	121	19	293
36	4,740	2,261	4,354	1,788	2,617	2,285	2,582	351	333	324	88	81	720
37	5 411	3,431	4,497	785	2 119	1,830	1,878	184	158	141	27	4	517
38	3,793	1,414	3,533	1,816	2,312	1,241	1,379	302	298	291	86	38	715
39	5,906	3,310	5,262	2,468	3,765	3,275	3,304	446	391	384	41	76	1,602
40	3,779	1,679	3,482	1,740	2,138	1,635	1,879	280	256	235	107	36	1,423
41	8,669	5,195	8,562	2,920	3,838	3,866	5,026	375	370	338	118	62	974
42	3,693	1,977	3,199	1,213	2,082	1,799	1,970	194	105	97	24	11	654
43	735	395	622	296	346	287	534	55	31	36	.....	4	69
44	1,034	723	969	399	574	504	841	41	38	28	1	1	92
45	28	61	28	15	15	....	21	4	......	....	......	......	.. ...
	200,366	121,831	182,716	76,879	108,510	116,878	182,006	15,208	12,863	12,165	3,787	3,172	41,663
1	935	422	969	359	698	698	1,489	.....	.....	......	......	...	......
2	2,631	2,651	1,785	530	1,109	2,651	2,631	.....	......	......	......	......	......
3	1,474	1,624	1,277	620	620	543	1,624	..	.....	......	......	......	......
4	1,322	1,689	1,718	349	807	807	1,689	132	.. .	......	......	....	......
5	6,453	3,426	6,723	2,089	3,080	6,723	8,788	475	475	475	1,933	243	......
6	1,324	2,112	1,808	594	938	1,119	2,590	.....	.. ..	......	......	......	.....
7	6,150	6,150	2,808	841	2,162	6,150	6,150	....	.....	.....	......	......	......
8	2,509	1,570	2,509	1,260	1,260	5,076	5,076	220	220	220	......	......	.. ...
9	1,141	....	1,141	232	398	398	....	......	... ..	......	......	......	......
10	1,307	....	1,411	432	913	913	2,177	.....	......	......	......	......	......
11	1,105	1,084	973	397	661	1,106	1,568	......	......	. .....	......	......	......
12	29,337	27,507	28,912	4,936	7,624	18,391	29,036	4,193	2,066	1,053	487	885	570
13	1,518	843	1,235	224	548	2,235	1,568	......	......	... ..	.....	......	.....
	57,711	54,078	53,214	12,863	20,818	46,810	64,406	5,020	2,761	1,748	2,420	628	570

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II.—TABLE B.—

Towns.	Number of pupils in the								
	Reading.						Writing.	Arithmetic.	Drawing.
	1st Reader, Part I.	1st Reader, Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.			
1 Alliston	74	37	53	83	86	70	353	353	353
2 Almonte	80	67	96	75	83	....	401	401	354
3 Amherstburg	98	43	59	29	48	8	285	285	285
4 Arnprior	159	118	114	99	87	....	577	577	577
5 Aurora	64	46	94	66	62	....	332	332	332
6 Aylmer	55	79	115	82	118	....	449	449	449
7 Barrie	277	165	305	267	225	47	1,286	1,286	1,286
8 Berlin	223	277	399	279	233	....	1,411	1,411	1,411
9 Blenheim	79	102	117	52	51	43	444	444	439
10 Bothwell	32	45	33	42	25	33	210	210	210
11 Bowmanville	94	84	106	108	121	....	513	513	513
12 Bracebridge	268	162	285	88	69	49	871	871	871
13 Brampton	123	74	105	126	111	....	539	539	539
14 Brockville	311	178	335	330	195	....	1,349	1,349	1,349
15 Carleton Place	287	128	184	161	160	....	870	870	870
16 Clinton	86	94	97	119	114	....	510	510	510
17 Cobourg	110	85	121	159	124	....	599	599	599
18 Collingwood	349	136	244	235	317	....	1,281	1,281	1,281
19 Cornwall	161	113	122	116	134	....	646	646	646
20 Deseronto	240	121	128	78	90	....	657	657	537
21 Dresden	112	80	45	70	70	49	426	426	416
22 Dundas	145	119	51	141	117	....	573	573	573
23 Durham	67	66	73	57	62	70	395	395	395
24 Essex	115	55	76	52	65	....	363	363	363
25 Forest	77	62	61	62	67	....	329	329	329
26 Fort William	255	178	141	90	105	....	764	764	764
27 Galt	321	149	326	331	308	21	1,456	1,456	1,456
28 Gananoque	161	104	181	161	132	....	739	739	739
29 Goderich	109	112	152	226	112	....	711	711	602
30 Gore Bay	43	30	71	65	37	27	273	273	258
31 Gravenhurst	271	156	125	105	99	....	756	756	756
32 Harriston	66	....	144	62	101	....	373	373	373
33 Hawkesbury	25	17	23	21	43	....	129	129	129
34 Ingersoll	187	100	224	170	144	....	825	825	825
35 Kincardine	104	52	89	112	114	....	471	471	471
36 Leamington	119	94	122	82	114	....	531	531	531
37 Lindsay	246	120	240	276	201	....	1,083	974	1,015
38 Listowel	182	67	77	182	127	12	647	647	647
39 Little Current	38	26	25	46	24	7	166	166	166
40 Mattawa	32	12	19	16	15	17	111	111	79
41 Meaford	112	41	94	78	63	....	388	388	388
42 Midland	243	86	132	128	73	36	698	698	698
43 Milton	101	64	71	40	40	51	367	367	367
44 Mitchell	93	61	66	121	88	....	429	429	429
45 Mount Forest	87	84	121	95	95	....	482	482	482
46 Napanee	116	87	114	131	204	....	652	652	652
47 Newmarket	106	43	92	88	71	....	400	400	400
48 Niagara	58	13	72	72	69	....	284	284	284
49 Niagara Falls	175	80	111	123	150	....	639	639	639
50 North Bay	154	75	58	49	58	53	411	436	411
51 North Toronto	153	68	84	90	56	21	472	472	472
52 Oakville	87	65	55	69	52	....	328	328	328
53 Orangeville	93	111	113	100	107	....	524	524	524
54 Orillia	228	167	201	240	183	62	1,081	1,081	1,081
55 Oshawa	162	104	155	215	143	....	779	779	779
56 Owen Sound	311	196	334	288	280	....	1,409	1,409	1,409
57 Palmerston	110	67	62	90	69	55	453	453	453
58 Parkhill	44	39	35	77	75	....	270	270	270
59 Paris	109	94	106	167	104	....	580	580	580
60 Parry Sound	205	158	97	100	97	42	680	699	680

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...he Public Schools.

...ifferent branches of instruction.

Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.
353	152	220	245	353	40
211	83	122	83	.....	.....
119	55	84	175	195	8
418	87	138	418	577	.....
332	62	128	332	270	.....
343	81	132	132	449	.....
939	539	483	826	1,188	682
512	122	230	233	1,411	.....
308	94	140	195	57	35
210	58	58	100	.....	33
281	121	229	335	513	.....
363	118	118	118	871	49
539	111	237	188	407	.....
1,038	355	355	525	1,349	.....
397	160	254	160	191	.....
233	72	233	72	510	.....
396	124	227	124	120	.....
671	462	552	1,210	1,281	.....
646	134	190	646	646	.....
417	120	168	168	481	.....
280	138	189	160	.....	39
428	137	258	573	573	.....
328	132	189	242	328	70
363	65	117	363	363	.....
329	67	129	129	216	.....
452	55	195	308	543	.....
1,077	266	606	1,456	369	21
739	132	293	474	198	.....
338	156	196	112	711	.....
122	57	83	75	103	12
329	99	204	329	187	.....
250	101	198	198	198	.....
77	32	41	41	129	.....
583	144	247	825	825	.....
423	114	226	337	.....	114
393	114	196	393	475	.....
806	201	326	201	355	.....
398	139	201	398	.....	12
166	76	76	101	165	7
79	48	48	32	111	13
388	63	187	388	388	.....
504	205	237	369	698	36
131	91	131	367	367	51
275	88	142	88	.....	.....
395	142	190	311	482	.....
612	322	376	376	.....	.....
400	71	132	251	400	.....
253	69	141	141	143	.....
384	91	273	273	639	91
851	154	154	298	442	22
472	77	167	34	472	21
176	52	89	140	239	.....
524	107	207	320	524	.....
790	245	485	445	53	245
472	79	143	143	265	.....
902	280	568	568	1,409	.....
343	124	214	53	329	28
152	75	152	152	.....	.....
271	104	208	580	.....	.....
410	139	239	294	602	23

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II.—TABLE B.—

Towns.—*Con.*	Number of pupils in the								
	Reading.								
	1st Reader, Part I.	1st Reader, Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.	Writing.	Arithmetic.	Drawing.
61 Pembroke	183	88	81	104	199	....	655	655	655
62 Penetanguishene	112	77	62	47	42	5	345	345	156
63 Perth	120	59	124	145	126	....	574	574	574
64 Peterborough	388	271	338	3.0	373	....	1,690	1,690	1,690
65 Petrolea	277	146	160	233	220	....	1,036	1,036	1,036
66 Picton	137	87	133	125	146	....	628	628	628
67 Port Arthur	171	67	82	94	79	....	493	493	493
68 Port Hope	192	150	179	152	170	....	843	843	561
69 Prescott	104	72	63	60	105	....	404	404	404
70 Preston	61	98	96	68	46	....	372	372	372
71 Rat Portage	346	162	187	152	95	81	1,023	1,023	1,023
72 Renfrew	136	65	41	100	136	....	478	478	478
73 Ridgetown	120	58	109	90	123	....	500	500	500
74 Sandwich	97	32	104	59	33	....	325	325	245
75 Sarnia	352	217	243	249	322	....	1,383	1,383	1,383
76 Sault Ste. Marie	273	100	86	151	92	47	702	749	740
77 Seaforth	57	81	41	91	145	16	431	431	431
78 Simcoe	99	81	104	107	113	....	504	504	504
79 Smith's Falls	334	131	205	188	157	....	1,015	1,015	1,015
80 Stayner	93	36	47	60	35	44	301	311	301
81 Sturgeon Falls	40	17	31	17	16	4	124	124	120
82 St. Mary's	130	112	125	263	175	....	805	805	563
83 Strathroy	116	98	124	92	133	....	563	563	563
84 Sudbury	59	24	45	27	40	24	219	219	219
85 Thessalon	88	33	89	89	22	4	220	220	220
86 Thornbury	46	28	26	41	44	17	202	202	202
87 Thorold	67	57	64	82	76	....	346	346	346
88 Tilsonburg	75	47	105	99	117	....	443	443	443
89 Toronto Junction	461	329	277	309	294	4	1,674	1,674	1,674
90 Trenton	170	113	156	142	82	....	663	663	663
91 Uxbridge	65	87	85	106	65	....	408	408	408
92 Vankleekhill	51	18	87	41	58	....	205	205	205
93 Walkerton	89	77	128	102	127	....	523	523	523
94 Walkerville	51	45	47	52	59	....	254	254	254
95 Wallaceburg	133	121	85	138	56	97	605	611	617
96 Waterloo	130	89	147	153	122	....	641	641	641
97 Welland	75	81	64	106	83	....	409	409	409
98 Whitby	97	49	77	110	110	....	443	443	443
99 Wiarton	134	75	157	105	90	....	561	561	561
100 Wingham	87	67	111	112	66	67	510	510	476
101 Woodstock	456	315	337	330	295	....	1,733	1,733	1,733
Total	14,862	9,411	12,197	12,343	11,424	1,183	61,283	61,281	60,143
Totals.									
1 Counties, etc	67,230	45,191	57,853	60,515	56,159	13,848	292,451	294,549	279,571
2 Cities	14,071	9,048	13,077	15,649	12,648	3,018	66,860	67,506	67,200
3 Towns	14,862	9,411	12,197	12,343	11,424	1,183	61,283	61,281	60,143
4 Grand total, 1899	96,163	63,650	82,627	88,507	80,231	18,049	420,594	423,336	406,914
5 " 1898	98,565	65,163	82,707	89,360	81,753	19,179	422,987	428,207	410,468
6 Increase	....	....	....	....	....	....	....	....	....
7 Decrease	2,402	1,513	80	853	1,522	1,130	2,393	4,871	3,554
8 Percentage	22	15	19	21	19	4	98	99	95

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The Public Schools.

different branches of instruction.

	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.
61	472	655	655	199	303	303	655	......	......	......	......	......	......
62	156	200	156	94	94	25	....	5	5	5	5	......	......
63	395	....	395	126	191	126	574	......	......	......	......	......	......
64	1,031	575	1,690	231	693	693	1,317	......	......	......	......	......	......
65	910	1,036	858	240	457	1,030	1,036	......	......	......	......	......	......
66	404	552	404	146	250	400	439	......	......	......	......	......	......
67	322	....	255	79	170	79	....	......	......	......	......	......	......
68	501	618	501	170	245	822	822	......	......	......	......	......	......
69	404	404	404	165	165	165	404	......	......	......	......	......	......
70	372	372	304	46	114	186	....	......	......	......	......	......	......
71	515	806	347	828	328	945	1,028	49	81	81	81	46	......
72	368	478	245	136	245	245	....	......	......	......	......	......	......
73	380	422	380	218	169	169	422	......	......	......	......	......	......
74	208	185	168	85	73	83	128	......	......	......	......	......	......
75	891	1,110	1,164	424	571	1,201	1,072	......	......	......	......	......	......
76	467	702	876	139	290	867	749	38	47	47	20	20	....
77	293	214	293	150	252	208	165	16	16	16	16	16	......
78	504	504	210	113	210	841	504	......	......	......	......	......	......
79	1,015	1,015	1,015	157	234	1,015	1,015	......	......	......	......	......	......
80	172	107	132	75	104	65	....	80	44	44	20	10	......
81	124	....	124	37	37	37	....	......	4	4	......	4	......
82	563	175	465	175	438	175	165	......	......	......	......	......	......
83	349	563	349	89	225	563	563	1	......	......	......	......	......
84	145	....	219	57	91	67	....	24	24	24	14	......	......
85	137	137	137	82	82	82	82	26	4	4	4	4	......
86	202	202	202	61	102	202	202	17	17	17	17	17	......
87	285	....	282	76	158	223	....	......	......	......	......	......	......
88	368	443	821	162	162	273	443	......	......	......	......	......	......
89	1,170	1,596	974	298	607	298	1,674	4	4	......	......	......	......
90	380	312	429	82	260	224	289	......	......	......	......	......	......
91	279	408	279	65	113	113	313	......	......	......	......	......	......
92	205	106	205	99	99	99	205	......	......	......	......	......	......
93	357	166	523	127	229	523	366	......	......	......	......	......	......
94	204	51	203	59	111	254	45	......	......	......	......	......	......
95	543	630	630	136	204	194	630	80	97	97	80	70	......
96	422	56	511	122	177	122	....	......	......	......	......	......	......
97	327	....	344	83	189	284	152	......	......	......	......	......	......
98	443	443	443	110	204	413	443	......	......	......	......	......	......
99	302	561	310	113	194	170	81	......	......	......	......	......	......
100	346	367	316	133	178	66	....	67	47	47	47	44	......
101	963	1,733	625	625	625	793	1,733	......	......	......	......	......	......
	43,755	40,255	42,834	13,998	22,394	31,807	41,333	2,009	1,158	1,151	596	530	165
1	200,366	121,831	182,716	76,879	108,510	116,878	132,006	15,208	12,863	12,165	3,787	8,172	41,068
2	57,711	54,078	53,214	12,863	20,818	46,810	64,406	5,020	2,761	1,748	2,420	628	570
3	43,755	40,255	42,834	13,998	22,394	31,807	41,333	2,009	1,158	1,151	596	530	165
4	301,832	216,164	278,764	103,740	151,722	195,495	237,745	22,237	16,782	15,064	6,803	4,330	42,398
5	314,181	220,048	289,499	108,565	155,123	201,812	231,973	23,129	17,985	17,567	4,486	3,416	1,244
6	......	......	......	......	......	......	5,722	......	......	......	2,317	914	41,154
7	12,349	3,884	11,735	4,825	3,401	6,317	....	892	1,203	2,503	......	......	......
8	70	50	65	24	35	46	55	5	4	4	1.6	1	10

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III—TABLE C.—The

Counties (Including incorporated villages, but not cities or towns.)	Public School teachers. Total number. Public School teachers.	Male.	Female.	Average salaries. Highest salary paid.	Average salary, male teacher.	Average salary, female teacher.
				$	$	$
1 Brant	68	26	42	575	386	297
2 Bruce	216	86	130	725	340	241
3 Carleton	136	50	86	600	341	263
4 Dundas	105	45	60	700	324	251
5 Dufferin	100	30	70	600	304	251
6 Durham	117	51	66	550	337	259
7 Elgin	125	52	73	690	363	278
8 Essex	142	63	79	650	385	288
9 Frontenac	150	38	112	450	261	216
10 Glengarry	83	22	61	550	310	242
11 Grey	255	96	159	705	332	252
12 Haldimand	99	41	58	700	344	271
13 Haliburton, N. E. Muskoka, S. Nipissing and E. Parry Sound	135	21	114	675	342	204
14 Halton	77	32	45	600	370	275
15 Hastings	203	58	145	700	345	250
16 Huron	221	111	110	700	353	251
17 Kent	150	48	102	600	383	277
18 Lambton	200	68	132	600	347	268
19 Lanark	130	18	112	600	284	228
20 Leeds and Grenville	260	64	196	700	289	228
21 Lennox and Addington	126	32	94	550	290	229
22 Lincoln	82	31	51	600	395	276
23 Middlesex	209	82	127	525	341	250
24 Norfolk	121	44	77	600	322	248
25 Northumberland	129	57	72	700	328	245
26 Ontario	140	62	78	800	359	262
27 Oxford	138	78	60	650	385	266
28 Peel	89	33	56	600	354	276
29 Perth	119	59	60	550	371	274
30 Peterborough	115	40	75	650	320	242
31 Prescott and Russell	114	30	84	*1,200	378	225
32 Prince Edward	82	34	48	550	298	242
33 Renfrew	151	29	122	500	284	216
34 Simcoe and W. Muskoka	295	140	155	750	336	251
35 Stormont	87	28	59	450	309	238
36 Victoria and S. E. Muskoka	168	57	111	575	321	231
37 Waterloo	135	64	71	750	412	267
38 Welland	103	40	63	720	371	263
39 Wellington	167	87	80	650	357	262
40 Wentworth	96	44	52	500	375	272
41 York	205	88	117	700	391	287
42 District of Algoma	138	55	83	750	308	252
43 " of N. Nipissing	48	10	38	500	310	215
44 " of W. Parry Sound	64	21	43	400	267	221
Total	6,093	2,265	3,828	800	344	251

* Plantagenet French

Public Schools.—

teachers.

	Attended a Normal School.	Certificates.						
	Number of teachers who have attended a Normal School.	Total number of certificates.	Provincial 1st class.	Provincial 2nd class.	1st class old County Board.	2nd class old County Board.	3rd class.	Temporary certificates.
1	36	68	10	27	....	....	31	....
2	71	216	10	64	....	....	142	....
3	50	136	5	46	....	2	83	....
4	33	105	3	30	1	....	71	....
5	26	100	3	23	....	....	73	1
6	46	117	7	38	....	2	70	....
7	43	125	6	39	....	....	77	3
8	43	142	4	44	....	....	88	6
9	35	150	3	32	....	1	110	4
10	22	83	1	21	....	....	61	....
11	62	255	6	62	1	....	186	....
12	39	99	10	31	1	....	57	....
13	9	135	11	4	....	1	110	9
14	31	77	2	30	1	....	44	....
15	58	203	2	57	....	....	144	....
16	94	221	7	90	....	....	124	....
17	62	150	3	59	....	....	88	....
18	84	200	3	81	....	....	116	....
19	26	130	1	26	2	....	101	....
20	47	260	8	43	....	....	209	....
21	22	126	2	21	....	2	101	....
22	39	82	5	35	1	....	40	1
23	99	209	5	96	....	2	106	....
24	31	121	4	31	....	2	84	....
25	49	129	2	49	....	1	77	....
26	54	140	6	48	....	....	80	6
27	49	138	11	36	1	....	90	....
28	35	89	3	32	....	....	54	....
29	58	119	5	54	....	....	60	....
30	43	115	2	42	....	1	70	....
31	10	114	3	8	....	....	102	1
32	18	82	3	15	....	....	64	....
33	14	151	1	13	....	....	135	2
34	79	295	12	71	....	....	212	....
35	24	87	2	24	....	1	60	....
36	35	168	1	35	1	....	128	3
37	76	135	7	69	....	....	57	2
38	30	103	4	27	2	....	70	....
39	68	167	5	63	1	....	97	1
40	50	96	9	42	2	....	43	....
41	109	205	6	107	2	3	87	....
42	19	138	8	57	1	....	68	4
43	4	48	1	7	....	....	36	4
44	4	64	....	7	....	....	55	2
	1,931	6,093	212	1,836	17	18	3,961	49

training school.

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III.—TABLE C.—

Cities.	Public School (Total number.) Public School teachers.	Male.	Female.	Public School (Average salaries.) Highest salary paid.	Average salary, male teacher.	Average salary, female teacher.
				$	$	$
1 Belleville	23	4	19	750	650	372
2 Brantford	44	4	40	1,100	656	365
3 Chatham	27	3	24	800	700	310
4 Guelph	31	8	23	1,150	562	338
5 Hamilton	149	16	133	1,200	897	408
6 Kingston	52	3	49	725	667	360
7 London	125	14	111	1,200	900	406
8 Ottawa	87	23	64	1,500	908	454
9 St. Catharines	25	3	22	900	708	373
10 St. Thomas	40	8	32	1,000	608	297
11 Stratford	23	....	23	575	....	362
12 Toronto	551	68	483	1,500	926	497
13 Windsor	42	3	39	900	800	419
Total	1,219	157	1,062	1,500	854	438
Towns.						
1 Alliston	6	1	5	550	550	235
2 Almonte	10	2	8	600	525	313
3 Amherstburg	5	2	3	550	475	300
4 Arnprior	10	1	9	675	675	283
5 Aurora	5	1	4	750	750	306
6 Aylmer	8	1	7	600	600	312
7 Barrie	21	6	15	900	548	303
8 Berlin	21	5	16	1,100	658	282
9 Blenheim	8	2	6	650	460	291
10 Bothwell	4	1	3	500	500	267
11 Bowmanville	9	2	7	700	575	336
12 Bracebridge	8	1	7	600	600	253
13 Brampton	10	1	9	800	800	317
14 Brockville	24	....	24	500	....	334
15 Carleton Place	14	2	12	650	575	257
16 Clinton	8	1	7	825	825	296
17 Cobourg	11	3	8	700	483	303
18 Collingwood	19	2	17	950	750	287
19 Cornwall	11	3	8	900	616	269
20 Deseronto	11	1	10	850	850	322
21 Dresden	8	1	7	650	650	282
22 Dundas	10	1	9	800	800	333
23 Durham	7	3	4	700	535	255
24 Essex	5	1	4	575	575	262
25 Forest	6	1	5	725	725	300
26 Fort William	11	2	9	900	750	361
27 Galt	23	3	20	1,000	833	363
28 Gananoque	12	2	10	1,000	725	290
29 Goderich	12	1	11	900	900	308
30 Gore Bay	4	2	2	575	462	235
31 Gravenhurst	9	2	7	600	450	261
32 Harriston	7	1	6	550	550	262
33 Hawkesbury	3	1	2	450	450	275
34 Ingersoll	13	2	11	900	610	313
35 Kincardine	9	2	7	850	675	275
36 Leamington	9	1	8	600	600	278
37 Lindsay	19	3	16	1,000	800	330
38 Listowel	9	1	8	575	575	271
39 Little Current	3	1	2	480	480	225
40 Mattawa	3	1	2	600	600	275
41 Meaford	8	1	7	600	600	260
42 Midland	11	2	9	650	525	244
43 Milton	7	1	6	750	750	297

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The Public Schools.

teachers.

	Attended a Normal School.	Certificates.						
	No. of teachers who have attended a Normal School.	Total number of certificates.	Provincial 1st class.	Provincial 2nd class.	1st class old County Board.	2nd class old County Board.	3rd class.	Temporary certificates.
1	21	23	1	21	......	......	1	......
2	35	44	4	38	......	......	2	......
3	24	27	3	22	......	......	2	......
4	22	31	4	20	......	......	7	......
5	128	149	40	87	5	5	12	......
6	51	52	6	46	......	......	......	......
7	104	125	11	99	......	......	15	......
8	86	87	25	62	......	......	......	......
9	21	25	3	18	2	2	......	......
10	32	40	3	29	......	......	8	......
11	20	23	......	20	......	......	3	......
12	545	551	77	468	6	......	......	......
13	34	42	3	33	1	......	5	......
	1,123	1,219	180	963	14	7	55	......
1	5	6	1	4	......	......	1	......
2	10	10	1	9	......	......	......	......
3	2	5	2	......	......	......	3	......
4	6	10	6	......	......	......	4	......
5	5	5	1	4	......	......	......	......
6	5	8	1	6	......	......	1	......
7	19	21	3	18	......	......	......	......
8	13	21	1	12	......	......	8	......
9	5	8	......	5	......	......	3	......
10	4	4	......	4	......	......	......	......
11	8	9	......	8	......	1	......	......
12	4	8	......	5	......	......	3	......
13	10	10	1	9	......	......	......	......
14	20	24	1	18	......	......	5	......
15	5	14	......	6	1	......	7	......
16	5	8	2	5	......	......	1	......
17	10	11	2	7	......	......	2	......
18	9	19	......	9	......	......	10	......
19	10	11	1	10	......	......	......	......
20	11	11	3	8	......	......	......	......
21	4	8	3	1	......	......	4	......
22	10	10	1	9	......	......	......	......
23	4	7	2	3	......	......	2	......
24	3	5	3	......	......	......	2	......
25	6	6	1	5	......	......	......	......
26	2	11	2	9	......	......	......	......
27	21	23	2	20	1	......	......	......
28	5	12	2	5	......	......	5	......
29	12	12	2	10	......	......	......	......
30	2	4	1	2	......	......	1	......
31	3	9	......	3	......	......	6	......
32	2	7	1	5	......	......	1	......
33	3	3	......	3	......	......	......	......
34	7	13	1	6	2	......	4	......
35	4	9	1	4	......	......	4	......
36	5	9	......	5	......	......	4	......
37	19	19	2	17	......	......	......	......
38	6	9	1	6	......	......	2	......
39	1	3	1	......	......	......	2	......
40	2	3	1	1	......	......	1	......
41	5	8	1	4	......	......	3	......
42	7	11	1	7	......	......	3	......
43	5	7	1	4	......	......	2	......

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III.—TABLE C.—The

Towns.—*Con.*	Public School: Total number: Public School teachers.	Male.	Female.	Average salaries: Highest salary paid.	Average salary, male teacher.	Average salary, female teacher.
				$	$	$
44 Mitchell	7	1	6	600	600	300
45 Mount Forest	9	1	8	700	700	274
46 Napanee	10	1	9	800	800	297
47 Newmarket	6	1	5	600	600	315
48 Niagara	4	1	3	600	600	333
49 Niagara Falls	9	2	7	850	700	393
50 North Bay	8	3	5	700	533	220
51 North Toronto	7	2	5	575	487	373
52 Oakville	6	1	5	600	600	253
53 Orangeville	11	5	6	800	460	300
54 Orillia	18	4	14	900	600	300
55 Oshawa	14	....	14	550	....	337
56 Owen Sound	25	2	23	1,000	825	325
57 Palmerston	8	1	7	575	575	249
58 Parkhill	3	1	2	450	450	475
59 Paris	10	2	8	800	600	300
60 Parry Sound	11	3	8	700	533	256
61 Pembroke	11	3	8	875	592	262
62 Penetanguishene	5	1	4	500	500	212
63 Perth	10	1	9	1,000	1,000	269
64 Peterborough	30	6	24	....	734	343
65 Petrolea	18	1	17	750	750	316
66 Picton	10	2	8	800	600	318
67 Port Arthur	7	1	6	900	900	347
68 Port Hope	16	2	14	1,000	800	298
69 Prescott	7	1	6	900	900	324
70 Preston	7	1	6	750	750	315
71 Rat Portage	16	6	10	1,000	692	445
72 Renfrew	8	1	7	825	825	314
73 Ridgetown	9	1	8	650	650	266
74 Sandwich	4	2	2	500	500	350
75 Sarnia	19	3	16	950	683	347
76 Sault Ste. Marie	11	3	8	900	612	309
77 Seaforth	7	1	6	750	750	302
78 Simcoe	8	2	6	800	725	354
79 Smith's Falls	15	2	13	700	550	267
80 Stayner	6	2	4	600	437	266
81 Sturgeon Falls	2	1	1	400	400	250
82 St. Mary's	9	1	8	725	725	287
83 Strathroy	9	2	7	850	725	318
84 Sudbury	4	1	3	550	550	300
85 Thessalon	4	2	2	500	480	255
86 Thornbury	5	1	4	475	475	270
87 Thorold	6	2	4	700	625	300
88 Tilsonburg	8	1	7	800	800	286
89 Toronto Junction	23	5	18	950	645	378
90 Trenton	9	3	6	600	400	300
91 Uxbridge	7	2	5	700	500	275
92 Vankleek Hill	4	1	3	750	750	325
93 Walkerton	10	3	7	850	543	286
94 Walkerville	5	1	4	700	700	428
95 Wallaceburg	10	2	8	700	550	297
96 Waterloo	11	3	8	800	637	296
97 Welland	7	3	4	500	350	296
98 Whitby	9	2	7	950	775	[illegible]
99 Wiarton	8	1	7	550	550	[illegible]
100 Wingham	8	1	7	775	775	[illegible]
101 Woodstock	30	5	25	900	610	[illegible]
Total	1,009	190	819	1,100	617	306

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Public Schools.

teachers.

	Attended a Normal School.	Certificates.						
	Number of teachers who have attended a Normal School.	Total number of certificates.	Provincial 1st class.	Provincial 2nd class.	1st class old County Board.	2nd class old County Board.	3rd class.	Temporary certificates.
44	4	7	1	4	....	....	2	....
45	8	9	1	7	....	....	1	....
46	8	10	2	6	1	1	....	....
47	5	6	2	4	....	....	....	....
48	4	4	....	4	....	....	....	....
49	9	9	....	9	....	....	....	....
50	8	8	2	2	....	....	3	1
51	6	7	....	6	....	....	1	....
52	3	6	....	4	1	....	1	....
53	9	11	3	7	....	....	1	....
54	16	18	....	16	....	....	2	....
55	13	14	....	13	....	....	1	....
56	23	25	1	22	....	....	2	....
57	6	8	....	6	....	....	2	....
58	3	3	....	3	....	....	....	....
59	2	10	....	10	....	....	....	....
60	7	11	2	7	....	....	2	....
61	6	11	....	5	1	....	5	....
62	2	5	....	2	....	....	2	1
63	8	10	1	7	....	....	1	1
64	28	30	2	27	....	1	....	....
65	13	18	....	13	....	....	5	....
66	8	10	1	7	....	....	1	1
67	2	7	1	5	....	....	1	....
68	15	16	1	14	....	....	1	....
69	6	7	1	6	....	....	....	....
70	6	7	1	4	....	....	2	....
71	12	16	3	9	....	....	4	....
72	6	8	1	5	....	....	2	....
73	6	9	....	6	....	....	3	....
74	2	4	....	2	....	....	2	....
75	17	19	2	17	....	....	....	....
76	8	11	2	6	....	....	2	1
77	6	7	....	6	1	....	....	....
78	5	8	1	7	....	....	....	....
79	10	15	1	10	....	1	1	2
80	4	6	2	4	....	....	....	....
81	1	2	1	....	....	....	1	....
82	7	9	1	6	....	....	2	....
83	8	9	1	8	....	....	....	....
84	3	4	1	3	....	....	....	....
85	2	4	1	1	....	....	2	....
86	5	5	1	4	....	....	....	....
87	5	6	....	5	1	....	....	....
88	4	8	1	4	....	....	3	....
89	23	23	1	22	....	....	....	....
90	5	9	1	4	....	....	4	....
91	5	7	1	4	....	....	2	....
92	4	4	1	3	....	....	....	....
93	10	10	2	8	....	....	....	....
94	5	5	1	4	....	....	....	....
95	6	10	3	3	....	....	4	....
96	9	11	3	6	....	....	2	....
97	4	7	1	3	....	....	3	....
98	2	9	2	4	3	....	....	....
99	4	8	....	4	....	....	4	....
100	7	8	....	8	....	....	....	....
101	29	30	1	28	1	....	....	....
	751	1,009	114	700	13	4	171	7

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III.—TABLE C.—The

Totals.	Public School					
	Total number.			Average salaries.		
	Public School teachers.	Male.	Female.	Highest salary paid.	Average salary, male teacher.	Average salary, female teacher.
				$	$	$
1 Counties, etc	6,093	2,265	3,828	800	344	251
2 Cities	1,219	157	1,062	1,500	854	438
3 Towns	1,009	190	819	1,100	617	306
4 Grand total 1899	*8,321	2,612	5,709	1,500	394	294
5 " 1898	8,294	2,576	5,718	1,500	396	293
6 Increase	27	36	......	......	......	1
7 Decrease	......	......	9	......	2	......
8 Percentage	......	31	69	......	......	......

* In addition, there were 248 Kindergarten

Public Schools.

teachers.

	Attended a Normal School.	Certificates.						
	Number of teachers who have attended a Normal School.	Total number of certificates.	Provincial 1st class.	Provincial 2nd class.	1st class old County Board.	2nd class old County Board.	3rd class.	Temporary certificates.
1	1,931	6,098	212	1,836	17	18	3,961	49
2	1,123	1,219	180	963	14	7	55	....
3	751	1,009	114	700	13	4	171	7
4	3,805	8,321	506	3,499	44	29	4,187	56
5	3,585	8,294	432	3,410	44	24	4,333	51
6	220	27	74	89	....	5	....	5
7	....	....	....	....	....	....	146	....
8	46	....	6.08	42.05	.53	.35	50.82	.67

teachers, and 37 Night School teachers.

IV.—TABLE D.—The

Counties.	Number of Schools open.	School houses. Brick.	Stone.	Frame.	Log.	Total.	School visits. Inspectors.	Trustees.	Clergymen.	Other persons.
1 Brant	61	43	2	15	1	61	138	108	61	282
2 Bruce	177	70	16	85	6	177	415	278	104	394
3 Carleton	118	27	18	64	9	118	192	192	54	581
4 Dundas	80	13	11	56	.....	80	213	109	19	223
5 Dufferin	91	51	4	34	2	91	180	112	69	282
6 Durham	105	71	1	33	.....	105	234	238	57	529
7 Elgin	108	73	.....	35	.....	108	269	168	42	459
8 Essex	117	27	4	86	.....	117	260	323	98	413
9 Frontenac	142	10	22	95	15	142	316	224	105	641
10 Glengarry	74	8	...	51	15	74	151	51	23	74
11 Grey	227	89	55	80	3	227	475	362	125	881
12 Haldimand	80	70	1	9	.....	80	202	141	39	296
13 Haliburton, etc.	115	6	2	66	41	115	161	261	155	408
14 Halton	75	40	15	20	....	75	154	185	67	770
15 Hastings	179	51	16	96	16	179	320	292	213	2,216
16 Huron	183	88	7	88	.....	183	387	405	89	1,292
17 Kent	132	60	.....	72	.....	132	321	209	102	712
18 Lambton	172	61	2	109	..	172	382	240	113	737
19 Lanark	122	14	14	89	5	122	255	257	67	501
20 Leeds and Grenville	229	62	79	81	7	229	507	207	52	362
21 Lennox & Addington	113	24	8	76	5	113	227	173	81	477
22 Lincoln	70	30	18	22	.....	70	136	153	44	399
23 Middlesex	184	122	.....	62	.....	184	402	200	79	693
24 Norfolk	101	60	6	35	.....	101	245	137	98	837
25 Northumberland	106	71	10	25	..	106	246	190	58	585
26 Ontario	118	60	2	55	1	118	267	214	120	536
27 Oxford	108	84	6	18	.....	108	229	210	80	806
28 Peel	77	52	6	19	....	77	177	75	54	185
29 Perth	111	70	6	35	....	111	239	163	100	552
30 Peterborough	101	52	2	30	17	101	244	127	202	333
31 Prescott and Russell	100	15	1	62	22	100	233	134	93	329
32 Prince Edward	78	40	15	23	.....	78	157	105	49	612
33 Renfrew	142	23	1	75	43	142	237	151	62	301
34 Simcoe	256	98	3	143	12	256	539	692	277	2,859
35 Stormont	75	2	....	72	1	75	150	52	23	133
36 Victoria	152	67	3	62	20	152	283	196	97	471
37 Waterloo	86	54	21	11	.....	86	172	363	89	1,679
38 Welland	89	50	6	33	.....	89	210	145	65	814
39 Wellington	188	72	42	24	.....	188	345	475	96	764
40 Wentworth	74	50	15	9	.....	74	199	163	40	348
41 York	159	107	1	51	.....	159	350	400	121	1,304
42 Algoma District	132	3	.....	67	62	132	129	242	155	432
43 N. Nipissing District	43	2	.....	21	20	43	44	54	34	44
44 W. Parry Sound "	58	1	.....	36	21	58	61	89	69	158
45 Moose Fort	1	..	.....	....	1	1	....	....	....	....
Total	5,259	2,143	441	2,330	345	5,259	11,053	9,210	3,840	27,629

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Public Schools.

		Maps, Globes.		Examinations, prizes.		Lectures.			Trees.	Prayers.			
	Total.	Total number of maps.	Total number of globes.	Number of examinations.	Number of schools distributing prizes.	Inspectors.	Other persons.	Total.	Number of trees planted on Arbor Day.	Number of schools using authorized Scripture readings.	Number opened and closed with prayer.	Number using Bible.	Number imparting religious instruction.
..	...												
1	589	652	78	22	9	1	1	2	131	58	60	8	......
2	1,176	1,587	121	60	9	76	3	79	412	104	177	110	..
3	1,019	923	89	66	19	6	4	10	462	48	114	52	22
4	564	597	85	49	15	29	....	29	305	63	80	26	1
5	643	667	78	30	10	32	2	34	365	19	88	69	31
6	1,058	862	113	35	7	65	......	65	120	66	105	32	....
7	938	927	104	41	15	2	2	4	263	89	108	33	33
8	1,044	1,011	115	53	11	3	3	6	193	56	117	35	33
9	1,286	815	82	65	22	27	3	30	218	73	131	58	38
10	299	415	44	27	2	30	.....	30	56	19	52	1	5
11	1,843	1,573	167	109	21	96	2	98	545	114	219	137	71
12	678	661	80	50	13	34	2	36	54	61	80	37	1
13	985	723	68	47	27	83	12	95	62	87	113	30	8
14	1,126	570	53	21	1	27	1	28	113	55	72	24	.....
15	3,041	1,423	169	174	.....	48	.....	48	325	79	178	114	21
16	2,113	1,945	190	34	9	145	3	148	337	101	183	126	29
18	1,344	1,154	125	192	10	67	..	67	375	80	182	54	27
17	1,472	1,456	129	57	4	31	......	31	374	113	172	76	5
19	1,080	816	9[illegible]	64	11	82	6	88	135	117	122	3	.....
20	1,128	1,377	147	109	9	95	4	99	174	196	225	12	8
21	958	769	103	55	4	13	.....	13	153	32	106	25	4
22	732	605	78	24	8	21	.....	21	99	54	68	10	.....
23	1,374	1,875	19[illegible]	107	20	33	19	52	388	107	183	93	44
24	1,317	779	82	48	6	1	6	7	128	91	101	39	33
25	1,079	882	91	58	7	65	8	73	170	69	106	42	36
26	1,137	950	107	33	17	3	1	4	376	77	112	25	27
27	1,325	1,108	115	8	4	3	.....	3	177	85	104	29	......
28	491	898	66	1	......	......	.....	......	379	54	83	46	14
29	1,054	1,086	92	21	11	42	...	42	349	55	110	52	24
30	906	572	71	26	10	4	.....	4	128	48	96	42	31
31	789	523	48	68	20	19	3	22	240	8	88	14	38
32	923	623	74	38	6	25	......	25	108	61	78	18	....
33	751	1,065	138	35	13	....	2	2	149	54	111	30	48
34	4,367	2,064	209	259	34	200	68	268	1,191	149	256	158	79
35	358	392	38	18	10	42	...	42	83	32	71	16	3
36	1,047	1,110	132	56	12	110	.....	110	267	61	151	63	50
37	2,303	875	97	72	13	1	3	4	325	73	86	21	....
38	1,234	856	86	23	16	2	.....	2	128	39	86	44	......
39	1,680	1,531	138	24	7	71	3	74	446	128	138	28	6
40	745	712	72	19	11	14	.....	14	193	59	80	16	.....
41	2,175	1,583	179	61	25	43	22	65	463	111	159	78	1
42	958	766	59	84	27	9	1	10	164	60	127	64	42
43	176	158	9	22	....	3	......	3	29	10	38	14	22
44	377	363	15	17	.....	8	......	8	84	18	54	42	23
45	....	7	1	....	......	......	......	......	....	1	1	1	1
	51,732	42,305	4,321	2,482	505	1,711	184	1,895	11,236	3,129	5,123	2,047	859

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IV.—TABLE D.—The

Cities.	No. of schools open.	School houses. Brick.	Stone.	Frame.	Log.	Total.	School visits. Inspectors.	Trustees.	Clergymen	Other persons.
1 Belleville	5	5				5	70	106	37	63
2 Brantford	6	6				6	93	88	18	261
3 Chatham	4	4				4	25	33	12	211
4 Guelph	7	1	6			7	109	246	33	439
5 Hamilton	18	15	3			18	892	188	100	3,061
6 Kingston	10	2	8			10	326	216	4	
7 London	19	18		1		19	424	57	13	110
8 Ottawa	19	18	1			19	367	315		566
9 St. Catharines	7	4		3		7	50	10	2	18
10 St. Thomas	5	5				5	10	16		
11 Stratford	6	6				6	180	36	3	75
12 Toronto	56	54		2		56	575	618	247	6,097
13 Windsor	7	7				7	261	407	47	111
Total	169	145	18	6		169	3,332	2,481	516	11,012
Towns.										
1 Alliston	1	1				1	12	24	12	68
2 Almonte	2		2			2	20		1	
3 Amherstburg	2		2			2	10	6		3
4 Arnprior	2	2				2	2	2		
5 Aurora	1	1				1	10			
6 Aylmer	2	2				2	29	59	4	38
7 Barrie	4	4				4	84	106	10	131
8 Berlin	4	4				4	15	100	6	50
9 Blenheim	1	1				1	29	18	4	11
10 Bothwell	1	1				1	4	3	5	4
11 Bowmanville	2	2				2	20	17	13	27
12 Bracebridge	1	1				1	18	8	1	
13 Brampton	4	4				4	27	98	2	2
14 Brockville	5	2	3			5	107	230	22	213
15 Carleton Place	3		3			3	28	13	3	3
16 Clinton	2	1		1		2	20	16		100
17 Cobourg	4	4				4	30	30	7	44
18 Collingwood	4	3		1		4	39	16	12	269
19 Cornwall	2	2				2	111	132	13	255
20 Deseronto	4	4				4	22			
21 Dresden	3	2		1		3	4		4	2
22 Dundas	1	1				1	20	5		
23 Durham	1	1				1	12	15	1	2
24 Essex	1	1				1	10	63		28
25 Forest	3	3				3	12	41	3	
26 Fort William	4	2		2		4	22	90	71	901
27 Galt	3		3			3	6	45		
28 Gananoque	3		2	1		3	2	10		
29 Goderich	4	1		3		4	40	16	4	110
30 Gore Bay	1			1		1	5		4	
31 Gravenhurst	3			3		3	20	11		
32 Harriston	2	1		1		2	18	72		15
33 Hawkesbury	1	1				1	6		2	6
34 Ingersoll	2	1		1		2	1		1	
35 Kincardine	3	3				3	17	33	18	95
36 Leamington	1	1				1	18	2		
37 Lindsay	5	5				5	56	48	7	
38 Listowel	1	1				1	8	4		
39 Little Current	2			2		2	4			24
40 Mattawa	1			1		1	2	2	2	5
41 Meaford	1	1				1	2	3	1	15
42 Midland	4	2		2		4	22	40		11
43 Mitchell	1			1		1	2	5		
44 Milton	1		1			1	15	24		
45 Mount Forest	1	1				1	24	7	1	251
46 Napanee	2	2				2	66	7		11
47 Newmarket	2	1		1		2	6	16	4	32
48 Niagara	1	1				1	8	15		8
49 Niagara Falls	1	1				1	3	40	7	2,000
50 North Bay	3	1		2		3	15	24	13	108

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Public Schools

	Total.	Maps, Globes. Total no. of maps.	Total no. of globes.	Examinations, prizes. No. of examinations.	No. of schools distributing prizes.	Lectures. Inspectors.	Other persons.	Total.	Trees. No. of trees planted on Arbor Day.	Prayers. No. of schools using authorized Scripture readings.	No. opened and and closed with prayer.	No. using Bible.	No. imparting religious instruction.
1	276	55	6							2	5	4	1
2	455	112	9							5	6	6	
3	281	58	4	1	2					4	4		
4	827	74	19	62	7					1	7	7	
5	4,191	501	64	2	18		5	5		18	18	5	
6	546	94	13	19							10	10	
7	604	194	27	14						18	19	10	
8	1,248	827	17	1			1	1			19	19	
9	80	50	8		7					7	7	1	
10	26	77	10							5	5	5	
11	244	98	7								6	6	
12	7,737	6,493	65	2	56	11	4	15	*		56	56	
13	826	81	13	2						2	7	4	2
	17,841	8,194	262	108	90	11	10	21		62	169	183	8
1	116	11	1	12		1	2	3	16	1	1	1	1
2	21	25	2							1	2	1	
3	19	24	1	2	1					2	2	1	
4	4	33	8							1	1		
5	10	27	3	1						1	1	1	
6	130	18	2	2						2	2		
7	331	87	6		4					1	4	3	
8	171	100	5	1						4	4	4	
9	62	11	1		1					1	1	1	
10	16	8		2		2	2	4		1	1		
11	77	20	7							1	2	2	
12	22	21	3	2							1	1	1
13	129	57	3							4	4	1	
14	572	36	6		5					5	2	3	
15	47	20	1	26						2	3		
16	136	40	4	2						1	2	1	
17	111	49	5		2				150	2	4	3	
18	336	50		8							4	4	
19	511	30	2	4					9		2	2	
20	22	11	4							3	4	1	
21	10	35	2				2	2		3	3		
22	25	28	10							1	1	1	
23	30	10	1						10			1	
24	101	13	3							1	1		
25	56	20	3			1		1			3	3	
26	1,064	7	4	14	1	2		2		1	3		
27	51	115	10	3						3	3		
28	12	25	4							1	1		
29	170	33	6			1	2	3		4	4		
30	9	11	1							1	1	1	
31	31	16	2	2					15	2	3	2	
32	105	18	2							2	2	2	
33	14	14	1							1	1	1	
34	2	42	4								2	2	
35	163	48									3	3	
36	20	24	2	8						1	1		
37	111	58	9							1	5	4	
38	7	12	2								1	1	
39	28	9	1								2		
40	11	15	1	1	1				10		1	1	1
41	21	12	1			3		3	8		1	1	
42	73	24	2								4		4
43	7	10	1								1	1	
44	39	12	2	2						1	1		
45	283	33	1							1	1	1	
46	84	12	3						7	2	2		
47	58	20	2							2	2		
48	31	16	1	1						1	1		
49	2,060	36	2	2						1	1		1
50	160	64	8			2	12	14	9		3	3	

* 13,000 plants and 5,500 bulbs.

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IV.—TABLE D.—The

Towns.—*Con.*	No. of schools open.	School houses. Brick.	Stone.	Frame.	Log.	Total.	School visits. Inspectors.	Trustees.	Clergymen.	Other persons.
51 North Toronto	2	2				2	14	20	1	29
52 Oakville	1	1				1	12	15	4	150
53 Orangeville	1	1				1	20	13	5	111
54 Orillia	3	3				3	64	53	7	44
55 Oshawa	3	3				3	43	13		24
56 Owen Sound	3	2	1			3		10		12
57 Palmerston	1	1				1	18	4		
58 Parkhill	1	1				1	11	9	1	3
59 Paris	4	3		1		4	39	45	8	27
60 Parry Sound	2			2		2	21	2	4	
61 Pembroke	3	3				3	3			
62 Penetanguishene	1	1				1	2	1	20	
63 Perth	1		1			1	5	2		
64 Peterborough	5	5				5	10	3	6	9
65 Petrolea	6	4		2		6	40	81		75
66 Picton	2	1	1			2	23	14		787
67 Port Arthur	1	1				1	14	105	30	210
68 Port Hope	3	3				3	2	32	3	47
69 Prescott	1	1				1	2	20		10
70 Preston	1	1				1	2	1	4	20
71 Rat Portage	4	2		2		4	1	74	1	31
72 Renfrew	2	2				2	4	10		
73 Ridgetown	1	1				1	2	3	3	4
74 Sandwich	2	2				2	12	8	2	14
75 Sarnia	6	6				6	58	185	11	26
76 Sault Ste Marie	2	1	1			2	4	12	5	64
77 Seaforth	1	1				1	2	4	2	4
78 Simcoe	1	1				1	2		1	
79 Smith's Falls	3	2	1			3	28	50	12	46
80 Stayner	1	1				1	3	1	4	
81 Sturgeon Falls	1	1				1	4		1	3
82 St. Mary's	4		4			4	18	5	2	6
83 Strathroy	3	3				3	35	19	7	17
84 Sudbury	1			1		1	1	2	2	2
85 Thessalon	2			2		2	2			
86 Thornbury	1	1				1	10	15		
87 Thorold	2	2				2	15	6	1	2
88 Tilsonburg	1	1				1	16	4		15
89 Toronto Junction	5	5				5	10	26		13
80 Trenton	3	1		2		3	18			30
91 Uxbridge	1	1				1	14	6	2	12
92 Vankleekhill	1	1				1	8	2	3	
93 Walkerton	2	2				2	18	11	7	3
94 Walkerville	1	1				1	12			
95 Wallaceburg	2	2				2	4	2	4	
96 Waterloo	1	1				1	22	13	14	155
97 Welland	4	4				4	19			
98 Whitby	3	3				3	6	15	1	25
99 Wiarton	1	1				1	16	7	10	17
100 Wingham	1	1				1	2			10
101 Woodstock	5	5				5	60	89	30	186
Total	226	165	25	36		226	1,844	2,478	476	7,085
Totals.										
1 Counties, etc	5,259	2,143	441	2,330	345	5,259	11,053	9,210	3,840	27,629
2 Cities	169	145	18	6		169	3,332	2,481	516	11,012
3 Towns	226	165	25	36		226	1,844	2,478	476	7,085
4 Grand total, 1899	5,654	2,453	484	2,372	345	5,654	16,229	14,169	4,832	45,726
5 Grond total, 1898	5,587	2,374	487	2,355	371	5,587	16,206	13,946	4,700	43,323
6 Increase	67	79		17		67	23	223	132	2,403
7 Decrease			3		26					
8 Percentage		43	9	42	6		20	17	6	5

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Public Schools.—*Con.*

		Maps, Globes.		Examinations, prizes.		Lectures.			Trees.		Pr
	Total.	Total No. of maps.	Total No. of globes.	No. of examinations.	No. of schools distributing prizes.	Inspectors.	Other persons.	Total.	No. of trees planted on Arbor Day.	No. of schools using authorized Scripture readings.	No. opened and closed with
51	64	26	4	....	.....	14	.....	14	....	....	
52	181	10	3	6	....	......	......	......	7	1	
53	149	34	3	....	....	.....	......	.....	....	....	
54	168	52	2	....	....	.....	.....	......	....	....	
55	80	37	4	....	3	......	.....	......	....	3	
56	22	58	11	....	......	......	......	....	....	....	
57	22	26	2	....		......	......	.....	....	....	
58	24	18	4	3	......	1	.....	1	....	1	
59	119	49	9	....	4	......	......	......	....	4	
60	27	39	3	....	......	......	......	......	....	2	
61	3	24	5	....	......	......	......	.	....	3	
62	23	10	1	....	......	......	......	......	....	....	
63	7	17	1	....	......	......	......	......	....	1	
64	28	78	10	....	....	......	......	......	....	....	
65	196	68	10	....	......	1	......	1	....	6	
66	824	35	5	1	....	......	......	......	....	2	
67	359	30	2	....	1	1	3	4	....	....	
68	84	15	3	....	......	......	......	......	....	3	
69	32	24	2	....	......	......	......	......	....	1	
70	27	15	2	1	1	1	......	1	8	1	
71	107	18	3	....	......	......	.....	......	....	....	
72	14	18	2	....	......	......	......	......	......	2	
73	12	12	2	....	......	......	......	......	....	1	
74	36	20	4	2	1	......	......	......	....	2	
75	230	71	4	2	......	......	1	1	....	6	
76	85	20	1	4	......	......	......	......	....	1	
77	12	17	8	2	......	......	5	5	....	1	
78	3	25	3	....	......	......	......	......	....	1	
79	136	45	2	....	......	......	......	......	....	....	
80	8	15	2	....	......	1	......	1	....	1	
81	8	5	1	1	......	......	......	......	....	1	
82	31	24	2	1	......	......	......	......	....	2	
83	78	22	4	....	......	2	2	4	....	....	
84	7	10	1	....	......	1	......	1	....	....	
85	2	7	1	....	......	......	......	.	....	....	
86	25	21	1	....	.....	5	......	5	3	....	
87	24	28	1	....	.....	....	2	2	....	....	
88	35	23	1	....	......	......	....	.....	....	....	
89	49	49	19	10	....	9	......	9	4	3	
90	48	30	6	....	...	......	......	......	....	....	
91	34	12	1	1	....	14	1	15	....	1	
92	13	8	1	1	......	.....	......	......	....	1	
93	39	10	2	....	......	......	......	......	....	2	
94	12	15	1	....	......	......	......	......	....	1	
95	10	28	3	1	2	......	1	1	17	2	
96	204	25	3	......	......	......	......	......	....	1	
97	19	16	2	....	.....	....	......	......	......	2	
98	47	39	5	....	......	1	......	1	....	3	
99	50	20	1	1	......	......	......	......	....	....	
100	12	12	1	....	.....	.....	.	......	....	1	
101	365	38	5	5	.... .	.....	......	.....	....	5	
	11,883	2,848	329	137	27	63	35	98	268	131	2
1	51,732	42,305	4,321	2,482	505	1,711	184	1,895	11,236	3,129	5,1
2	17,341	8,194	262	103	90	11	10	21	*	62	1
3	11,883	2,848	329	137	27	63	35	98	268	131	2
4	80,956	53,347	4,912	2,722	622	1,785	229	2,014	11,504	3,322	5,5
5	78,175	53,744	4,698	2,741	551	1,054	231	1,285	12,358	3,314	5,4
6	2,781	......	214	....	71	731	....	729	....	8	
7	......	897	....	19	..	...	2	......	854	.... ..	....
8	......	†.)	†1	....	11	89	11	.... .	.. ....	59	

* 13,000 plants and 5,500 bulbs. † To each school.

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V.—TABLE E.—The

Counties. (Including incorporated villages, but not cities or towns.	Receipts. Legislative grants.	Municipal grants and assessments.	Clergy reserve fund, balances and other sources	Total receipts for all Public School purposes.
	$ c.	$ c.	$ c.	$ c.
1 Brant	2,357 00	25,074 36	14,855 99	42,287 35
2 Bruce	8,348 00	69,202 28	34,529 01	112,079 29
3 Carleton	4,821 00	29,264 77	31,986 14	66,071 91
4 Dundas	3,231 00	33,728 38	7,565 17	44,524 55
5 Dufferin	3,666 00	26,814 73	24,337 02	54 817 75
6 Durham	3,654 00	40,617 59	16,481 29	60,752 88
7 Elgin	5,138 00	40,830 64	31,179 01	77,147 65
8 Essex	5,245 00	53,849 27	22,111 74	81,206 01
9 Frontenac	3,898 00	30,552 76	18,450 77	52,901 53
10 Glengarry	2,695 00	24,744 45	7,610 89	35,050 34
11 Grey	8,512 00	73,446 19	29,470 00	111,428 19
12 Haldimand	3,339 00	33,497 18	14,466 34	51,302 52
13 Haliburton, N. E. Muskoka, S. Nipissing and E. Parry Sound	10,057 00	32,780 66	8,953 79	51,791 45
14 Halton	2,894 00	23.615 74	14.455 71	40,965 45
15 Hastings	7,392 00	53,244 56	29.286 31	89 922 87
16 Huron	8,645 00	76,379 08	33,198 51	118,222 59
17 Kent	6,179 00	57,160 74	48,576 53	111,916 27
18 Lambton	6,823 00	70,157 23	33,282 98	110,263 21
19 Lanark	4,230 00	30,853 03	15,128 11	50,211 14
20 Leeds and Grenville	6,890 00	66,428 12	30,291 68	103,609 80
21 Lennox and Addington	3,538 00	30,786 50	14,602 37	48,926 87
22 Lincoln	2,764 00	33,385 40	11,382 20	47,531 60
23 Middlesex	7,965 00	74,685 37	37,541 56	120,191 93
24 Norfolk	4,084 00	40.204 43	26,093 44	70.381 87
25 Northumberland	4,654 00	42,392 64	22,480 99	69,527 63
26 Ontario	5,358 00	49,348 67	21,390 42	76,097 09
27 Oxford	5,464 00	53,110 53	36,483 46	95,057 99
28 Peel	2,971 00	33,318 15	15,672 22	51,961 37
29 Perth	4,635 00	46,362 08	19,874 82	70.871 90
30 Peterborough	3,879 00	36,192 03	9,472 93	49 543 96
31 Prescott and Russell	4,425 00	25,591 98	14,723 16	48,740 14
32 Prince Edward	2,423 00	11,720 07	20,401 10	34,544 17
33 Renfrew	6,322 00	35,869 68	14,089 66	56,281 34
34 Simcoe and W. Muskoka	14,969 00	95,413 86	43,685 23	154,068 09
35 Stormont	2,641 00	25,343 13	6,591 17	34,575 30
36 Victoria and S. E. Muskoka	10.932 00	43,138 99	14,291 26	68,362 25
37 Waterloo	4,516 80	52,253 89	43,838 36	100,609 05
38 Welland	3,641 00	37,342 03	22,368 94	63,351 97
39 Wellington	6,580 00	60,145 72	31,454 29	98,180 01
40 Wentworth	3,806 00	30,292 83	28,126 40	62.225 23
41 York	7,354 00	74,019 72	46,003 08	127,376 80
42 District Algoma	16,586 00	36,992 31	20.486 27	74,064 58
43 " N. Nipissing	3,970 00	10,188 34	3,037 64	17,195 98
44 " W. Parry Sound	7,675 00	10,989 89	6,774 37	25,439 26
45 Moose Fort	150 00	....	....	150 00
Total	249,316 80	1,885,330 00	997,082 33	3,131,729 13
Cities.				
1 Belleville	1,162 00	12,506 64	1,257 60	14,926 24
2 Brantford	2,436 00	24,000 00	6,639 04	33,075 04
3 Chatham	1,244 00	12,990 79	195 16	14,429 95
4 Guelph	1,291 00	15,821 00	962 58	18.074 58
5 Hamilton	6,634 00	109,333 00	10,869 54	126,836 54
6 Kingston	2,267 00	25.000 00	2,042 40	29,309 40
7 London	4,975 00	81,619 60	2,214 18	88,808 78
8 Ottawa	4,035 00	86,511 00	19,781 92	110,327 92
9 St. Catharines	1,196 00	14,402 00	525 37	16,123 37
10 St. Thomas	1,557 00	17,837 53	12,186 67	31.581 20
11 Stratford	1,410 00	13,000 00	1,807 85	16.217 85
12 Toronto	25,493 00	411 938 00	61,943 75	499,374 75
13 Windsor	1,827 00	22,766 66	1,368 09	25,961 75
Total	55,527 00	847,726 22	121,794 15	1,025,047 37

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Public Schools.

	Expenditure.					
	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes and libraries.	Rent and repairs, fuel and other expenses.	Total expenditure for all Public School purposes.	Bal. nces.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	22,688 64	1,519 21	468 65	5,724 45	30,395 95	11,891 40
2	61,502 42	8,751 10	1,045 19	14,311 50	85,610 21	26,469 08
3	40,286 73	5,227 22	659 98	9,713 40	56.887 33	10,184 58
4	29,274 03	1,902 79	583 75	6,936 08	38.696 65	5,827 90
5	25,666 46	9,465 75	829 83	7,538 91	43,500 95	11,316 80
6	34,175 84	4,470 62	363 46	7.969 05	46,978 97	13,773 91
7	40,109 90	2,475 37	898 17	11,728 62	55,211 96	21,935 69
8	46,452 80	5,833 30	953 49	16,073 35	69,312 94	11,893 07
9	31,815 83	2,588 33	826 75	7,417 69	42,648 60	10,252 93
10	22,104 95	2,107 83	636 52	3,978 58	28,827 88	6,222 46
11	66,814 82	6,490 77	1,850 52	17,331 41	92,487 52	18,940 67
12	29,909 02	709 90	350 11	7,632 04	38,601 07	12,701 45
13	29,199 76	6,628 27	1,398 39	7.378 77	44,605 19	7,186 26
14	23.815 38	1,271 75	164 27	6,637 75	31,889 15	9,076 30
15	56,544 87	3,346 61	713 25	10,070 17	70,674 90	19,247 97
16	66,870 81	6,445 74	1,018 17	16,907 90	91,242 62	26,979 97
17	46,695 32	9,711 89	1,489 22	15,703 97	73,600 40	38,315 87
18	58,595 35	8,759 45	950 10	16,357 90	84,662 80	25,600 41
19	30,568 09	1,574 10	493 31	6,136 18	38,771 68	11,439 46
20	62,823 88	5,998 34	1,034 27	15,580 56	85,437 05	18,172 75
21	30,237 99	1,796 82	456 68	6,303 58	38,795 07	10,131 80
22	26,071 96	2,169 18	297 15	7,721 12	36,259 41	11.272 19
23	64,128 03	4,141 21	1,621 24	19,545 77	89,436 25	30,755 68
24	32,806 68	1,779 18	1,014 24	10,165 56	45,765 66	24,616 21
25	36,888 44	3,507 95	433 56	14,543 73	55 371 68	14,155 95
26	43,572 30	4,087 22	1,333 79	12,336 54	61,829 85	14,267 24
27	46,102 93	3,002 41	459 51	11,884 57	61,449 42	33,608 57
28	26,629 42	5,576 09	622 44	7.289 24	40.117 19	11.844 18
29	37,800 53	5,575 77	625 75	11.115 17	55,117 22	15,754 68
30	30,934 25	1,900 03	227 33	8,235 78	41,327 39	8,216 57
31	28,285 98	3,941 19	584 70	7,170 25	39.982 12	8,758 02
32	21,691 46	832 60	298 92	4.049 50	26,872 48	7,671 69
33	35.136 27	5,784 62	869 26	5,875 26	47,665 41	8,615 93
34	84,082 15	12,912 15	2,724 35	19.090 30	118.808 95	35,259 14
35	22,541 25	3,154 17	486 26	4.765 81	30,947 49	3,627 81
36	43,350 64	2,686 93	711 14	9.374 61	56,123 32	12,238 93
37	45,513 99	7,078 53	386 93	12,548 86	65.528 31	35,080 74
38	31,722 40	4,269 30	374 17	7,583 42	43.949 29	19,402 68
39	53,213 30	4,880 54	513 46	14,796 76	73,404 06	24.775 95
40	31,062 39	1,946 31	790 01	9,264 91	43,063 62	19,161 61
41	68,588 38	6,362 99	1,547 34	21,579 06	98,077 77	29,299 03
42	39,429 85	6,637 41	1,204 48	9,930 17	57,201 91	16,862 67
43	9,159 27	2,502 07	568 77	2,788 03	15,018 14	2 177 84
44	12,942 32	2,693 14	679 37	3,157 86	19,473 19	5,966 07
45	125 00	....	10 00	15 00	150 00	....
	1,727,960 48	194,496 15	35,563 25	452,759 14	2,410,779 02	720,950 11
1	9,979 28	....	....	3,587 27	13,566 55	1,859 69
2	19,524 06	4,016 82	1,966 16	7,549 43	33,056 47	18 57
3	10,019 16	....	68 00	4,342 79	14,423 95	....
4	13,018 18	....	74 15	4.639 43	17,731 76	342 82
5	77,913 51	22,479 22	6,097 19	20.332 09	126,822 01	14 53
6	19,008 49	....	1,748 53	8 552 33	29,309 35	0 05
7	61,533 42	5,861 93	....	19 077 48	86,472 83	2,335 95
8	53,524 39	24,414 65	3,619 06	26,019 82	107,577 92	2,750 00
9	10,349 30	....	25 00	5,189 07	15,563 37	560 00
10	14,569 77	11,283 92	38 95	5,006 02	30.848 66	732 54
11	10 742 85	476 85	1,186 76	3,736 87	16,143 33	74 52
12	343 700 74	18,647 41	1,303 13	135,723 47	499,374 75	....
13	19,546 18	....	66 75	6,348 82	25,961 75	....
	663,429 33	87,130 80	16,193 68	250,104 89	1,016,858 70	8,188 67

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V.—TABLE E.—The

	Towns.	Receipts.			
		Legislative grants.	Municipal grants and assessments.	Clergy reserve fund, balances and other sources	Total receipts for all Public School purposes
		$ c.	$ c.	$ c.	$ c.
1	Alliston	222 00	1,810 00	349 95	2,381 95
2	Almonte	277 00	5,278 .9	685 59	6,241 08
3	Amherstburg	144 00	2,314 28	366 93	2,825 21
4	Arnprior	278 00	5,124 13	323 93	5,726 06
5	Aurora	188 00	2,250 00	748 73	3,186 73
6	Aylmer	292 00	4,148 49	333 28	4,773 77
7	Barrie	722 00	11,408 01	347 64	12,477 65
8	Berlin	1,188 00	13,127 20	237 79	14,552 99
9	Blenheim	215 00	3,271 70	374 10	3,860 80
10	Bothwell	118 00	1,666 42	331 74	2,116 16
11	Bowmanville	405 00	4,800 00	47 81	5 252 81
12	Bracebridge	596 00	2,646 97	227 95	3,470 92
13	Brampton	496 00	4,750 00	187 59	5.433 59
14	Brockville	949 00	13,000 00	749 07	14,698 07
15	Carleton Place	516 00	3,700 00	1,938 53	6,154 53
16	Clinton	467 00	3,100 00	533 68	4,100 68
17	Cobourg	379 00	5,500 00	388 84	6,267 84
18	Collingwood	830 00	8,600 00	881 86	10.311 86
19	Cornwall	483 00	4,395 91	2,863 03	7,741 94
20	Deseronto	399 00	4,592 72	975 67	5,967 39
21	Dresden	219 00	2,981 00	4,475 91	7,675 91
22	Dundas	396 00	3,881 25	601 95	4,379 20
23	Durham	304 00	2,494 31	382 87	3,181 18
24	Essex	175 00	1,965 98	27 30	2.168 28
25	Forest	342 00	2,650 00	346 71	3,338 71
26	Fort William	195 00	8.671 50	6,404 30	15,270 80
27	Galt	1,040 00	14,950 00	465 32	16.455 32
28	Gananoque	588 00	4,930 57	93 65	5,612 22
29	Goderich	562 00	5,126 80	89 00	5,777 80
30	Gore Bay	468 00	1,678 53	802 09	2,948 62
31	Gravenhurst	228 00	3,650 00	7 33	3,885 33
32	Harriston	219 00	2,431 00	300 33	2,950 33
33	Hawkesbury	47 00	1,600 00	63 30	1,710 30
34	Ingersoll	663 00	6,422 32	270 28	7,355 60
35	Kincardine	437 00	3,413 00	1,027 40	4,877 40
36	Leamington	356 00	3,300 00	171 43	3,827 43
37	Lindsay	803 00	9.713 74	187 33	10,704 07
38	Listowel	310 00	3.740 00	48 25	4,098 25
39	Little Current	147 00	1,426 00	441 62	2.014 62
40	Mattawa	316 00	989 00	260 69	1,565 69
41	Meaford	379 00	2,640 00	330 66	3,349 66
42	Midland	295 00	4,623 91	415 93	5,334 84
43	Milton	300 00	1,522 55	1,664 16	3,486 71
44	Mitchell	412 00	3,229 00	292 78	3,933 78
45	Mount Forest	444 00	3,431 00	264 35	4,139 35
46	Napanee	535 00	4,800 00	491 53	5.826 53
47	Newmarket	374 00	2,275 00	869 88	3,518 88
48	Niagara	147 00	1,784 26	94 74	2,026 00
49	Niagara Falls	485 00	6,100 00	249 33	6,834 33
50	North Bay	460 00	3 494 24	4,758 50	8,712 74
51	North Toronto	198 00	3,333 45	201 35	3,732 80
52	Oakville	181 00	3,994 90	29 05	4,204 95
53	Orangeville	589 00	4.115 00	104 25	4,808 25
54	Orillia	484 00	8 000 00	128 00	8,612 00
55	Oshawa	458 00	6,285 00	270 80	7.013 80
56	Owen Sound	1,103 00	15,352 08	257 10	16,712 18
57	Palmerston	234 00	2,994 55	279 71	3,508 26
58	Parkhill	156 00	1,794 00	767 17	2,717 17
59	Paris	340 00	2,533 80	2,166 14	5.039 64
60	Parry Sound	568 00	5,086 50	231 85	5,886 35
61	Pembroke	352 00	3,883 03	606 32	4,841 35
62	Penetanguishene	299 00	1 686 46	433 51	2.418 97
63	Perth	529 00	9 937 06	252 81	10,718 87
64	Peterborough	1,155 00	16,800 00	2,163 30	20,118 30

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Public Schools.

	Expenditure.					
	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes and libraries.	Rent and repairs, fuel and other expenses.	Total expenditure for all Public School purposes.	Balances.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	1,689 74	....	15 74	437 29	2,142 77	239 18
2	3,637 79	....	....	2,453 75	6.091 54	149 54
3	1,915 00	....	23 90	452 77	2,391 67	433 54
4	3,435 69	....	25 49	608 78	4,069 96	1,656 10
5	1,991 68	....	4 80	412 93	2,409 41	777 32
6	3,144 00	718 41	13 08	751 84	4,627 33	146 44
7	7,847 00	102 95	57 48	2,071 53	10,078 96	2,398 69
8	9,979 30	....	228 61	3,562 49	13,771 00	781 99
9	2.605 91	....	110 00	694 89	3,410 80	450 00
10	1,303 43	....	....	130 68	1,434 11	682 05
11	3,675 75	112 25	33 33	1,231 60	5,052 93	199 88
12	2,643 59	....	84 60	729 50	3,457 69	13 23
13	3,857 23	....	627 45	903 46	5,388 14	45 45
14	8,037 91	600 00	190 94	5,169 06	13,997 91	700 16
15	4.506 30	48 55	....	1,127 16	5,682 01	472 52
16	2,990 00	....	....	809 82	3,799 82	300 86
17	4.055 72	253 72	57 42	1,817 75	6,184 61	83 23
18	6,652 51	....	56 00	3,149 21	9,857 72	454 14
19	4,330 89	....	....	1,411 93	5,742 82	1,999 12
20	4,265 14	....	....	908 97	5,174 11	793 28
21	2,625 00	....	....	451 01	3,079 01	4,596 90
22	3,789 83	....	7 20	873 83	4,670 86	208 34
23	2,377 93	455 23	11 29	258 13	3,102 58	78 60
24	1,642 58	....	....	460 88	2,103 46	64 82
25	2,315 07	....	20 55	868 57	3,204 19	134 52
26	5,280 55	4,400 00	928 24	2,027 58	12,636 37	2,634 43
27	10,264 13	2,632 84	398 80	2,788 46	16,084 23	371 09
28	4,557 47	....	44 80	982 46	5,584 73	27 49
29	4,505 95	....	....	1,271 85	5,777 80	....
30	1,291 25	174 10	16 00	408 22	1,889 57	1,059 05
31	2,737 00	80 28	35 00	979 12	3,831 40	53 93
32	2,120 00	80 05	59 80	609 29	2,819 14	131 19
33	1,115 45	....	....	460 08	1,575 53	134 77
34	5.442 75	....	30 01	1,878 67	7,351 43	4 17
35	3,336 62	....	....	1,178 32	4,514 94	862 46
36	3 036 36	....	48 91	736 51	3,821 78	5 65
37	8,184 82	90 00	....	2,414 72	10,689 54	14 53
38	3,048 08	....	....	1,017 52	4,065 60	32 65
39	966 25	....	37 68	371 78	1,375 71	638 91
40	1,251 38	....	....	168 63	1,420 01	145 68
41	2,755 32	....	....	499 60	3,254 92	94 74
42	3,258 16	425 25	93 17	1,233 75	5,010 33	324 51
43	2,463 00	366 80	29 63	326 03	3,185 46	301 25
44	2.590 00	....	....	1,118 10	3,708 10	225 68
45	2,968 55	....	49 69	985 66	4,003 90	135 45
46	3,646 30	....	....	1,363 79	5,010 09	816 44
47	2,366 64	....	....	654 69	3,021 33	497 55
48	1,470 00	57 35	....	498 65	2,026 00	....
49	4,818 00	1,076 47	142 57	677 20	6,714 24	120 09
50	2,975 89	3,226 76	242 07	953 63	7,398 35	1,314 39
51	2,890 43	24 66	....	755 25	3,670 34	62 46
52	1,873 57	....	....	916 56	2,790 13	1,414 82
53	3,930 04	....	13 25	864 54	4,807 83	0 42
54	6,674 08	175 00	100 00	1,511 56	8,460 64	151 36
55	4.792 25	0 80	5 75	1,897 99	6,696 79	317 01
56	10,098 00	3,855 76	142 07	2,477 80	16,573 63	138 55
57	2,615 00	....	....	859 29	3,474 29	33 97
58	1,475 00	....	....	463 40	1,938 40	778 77
59	3.617 00	65 00	24 95	1,249 26	4,956 21	83 73
60	3,698 00	927 80	72 50	919 78	5,618 08	288 27
61	3,931 88	....	25 13	731 73	4,688 74	152 61
62	1,717 00	91 71	18 84	293 40	2,120 95	298 02
63	3,545 00	5,853 17	....	1,049 04	10,447 21	271 66
64	13,742 90	....	....	6,374 50	20,117 40	0 90

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V.—TABLE E.—The

Towns.—*Con.*	Receipts. Legislative grants.	Municipal grants and assessments.	Clergy reserve fund, balances and other sources	Total receipts for all Public School purposes.
	$ c.	$ c.	$ c.	$ c.
65 Petrolea	563 00	8,437 00	1,275 61	10,275 61
66 Picton	552 00	4,100 00	822 82	5,474 82
67 Port Arthur	271 00	3,710 17	1,779 43	5,760 60
68 Port Hope	710 00	6,245 56	425 00	7,380 56
69 Prescott	454 00	2,653 00	460 10	3,567 10
70 Preston	239 20	3,111 00	2,064 15	5,414 35
71 Rat Portage	6 2 00	22,699 00	32,317 55	55,628 55
72 Renfrew	376 00	5,610 45	1,286 89	7,272 84
73 Ridgetown	272 00	2,500 00	2,821 14	5,593 14
74 Sandwich	173 00	2,000 00	2,140 76	4,313 76
75 Sarnia	910 00	7,787 30	5,733 95	14,431 25
76 Sault Ste. Marie	750 00	5,700 00	470 77	6,920 77
77 Seaforth	296 00	3,650 00	860 80	4,806 80
78 Simcoe	497 00	3,582 82	669 21	4,749 03
79 Smith's Falls	543 00	6,045 60	161 25	6,749 85
80 Stayner	145 00	1,875 50	258 98	2,279 48
81 Sturgeon Falls	54 00	1,071 12	599 88	1,725 00
82 St. Mary's	416 00	4,100 00	553 89	5,069 89
83 Strathroy	527 00	4,160 00	457 51	5,144 51
84 Sudbury	160 00	2,386 46	409 28	2,955 74
85 Thessalon	286 00	1,493 75	149 50	1,929 25
86 Thornbury	75 00	1,766 49	318 11	2,159 60
87 Thorold	180 00	2,894 83	441 93	3,516 76
88 Tilsonburg	300 00	3,486 52	178 22	3,959 74
89 Toronto Junction	980 00	13,862 25	617 39	15,459 64
90 Trenton	387 00	3,710 32	175 84	4,273 16
91 Uxbridge	219 00	2,750 14	3 50	2,972 64
92 Vankleekhill	295 00	2,450 00	693 02	3,438 02
93 Walkerton	419 00	3,664 95	326 62	4,410 57
94 Walkerville	167 00	3 300 00	72 06	3,539 06
95 Wallaceburg	298 00	3,962 75	322 00	4,582 75
96 Waterloo	409 00	5,000 00	197 28	5,606 28
97 Welland	227 00	3,027 50	2,659 74	5,914 24
98 Whitby	413 00	4,250 00	59 86	4,722 86
99 Wiarton	258 00	2,405 34	606 56	3,269 90
100 Wingham	261 00	3,350 00	254 23	3,865 23
101 Woodstock	1,257 00	12,550 00	6,511 23	20,318 23
Total	42,407 20	486,544 93	115,834 55	644,786 68
Totals.				
1 Counties, etc	249,316 80	1,885,330 00	997,082 33	3,131,729 13
2 Cities	55,527 00	847,726 22	121,794 15	1,025,047 37
3 Towns	42 407 20	486,544 93	115,834 55	644,786 68
4 Grand total, 1899	347,251 00	3,219,601 15	1,234,711 03	4,801,563 18
5 " " 1898	340,470 78	3,305,381 74	1,184,407 24	4,830,259 76
6 Increase	6,780 22		50,303 79	
7 Decrease		85,780 59		28,696 58
8 Percentage	7	67	26	
Cost per pupil.				
1 Counties, etc	8 03			
2 Cities	15 06			
3 Towns	9 64			
4 Province	9 37			

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Public Schools.

	Expenditure.					
	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes and libraries.	Rent and repairs, fuel and other expenses.	Total expenditure for all Public School purposes.	Balances.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
65	6,167 75	...	...	2,958 20	9,125 95	1,149 66
66	4,030 36	...	107 95	1,322 05	5,460 36	14 46
67	2,850 22	...	48 70	2,813 71	5,712 63	47 97
68	5,775 00	...	14 90	1,590 66	7,380 56	...
69	2,589 56	...	...	906 14	3,495 70	71 40
70	2,902 52	...	...	779 77	5,682 29	1,732 06
71	8,140 93	11,098 87	1,890 83	34,423 36	35,553 99	74 56
72	3,269 50	781 95	90 56	3,130 83	7,272 84	...
73	2,732 82	...	6 20	2,524 28	5,263 30	329 84
74	1,729 50	...	...	427 83	2,157 33	2,156 43
75	8,679 96	3,015 74	...	1,170 87	12 866 57	1,564 68
76	4,794 63	...	...	2,107 68	6,902 31	18 46
77	2,565 00	...	...	1,346 55	3,911 55	895 25
78	4,113 00	...	...	539 07	4,652 07	96 96
79	4,628 40	...	127 47	1,540 54	6,296 41	453 44
80	1,790 00	...	33 59	262 41	2,086 00	193 48
81	650 00	20 30	1 30	860 59	1,532 19	192 81
82	3,066 18	...	29 00	1,823 00	4,918 18	151 71
83	3,850 00	...	...	1,290 50	5,140 50	4 01
84	1,270 00	3 45	...	837 56	2,111 01	844 73
85	1,488 29	...	...	199 51	1,687 80	241 45
86	1,555 00	...	...	372 58	1,927 58	282 02
87	2,450 00	...	...	634 38	3,084 38	432 38
88	3,152 58	...	39 66	767 50	3,959 74	...
89	10,703 40	...	...	4,594 39	15,297 79	161 85
90	2,672 72	...	21 00	981 60	3,675 32	597 84
91	2,358 68	...	...	603 19	2,961 87	10 77
92	1,888 15	9 80	60 49	653 69	2,612 13	825 89
93	3,552 45	...	...	829 76	4,382 21	28 36
94	2,438 04	...	34 91	848 42	3,321 37	217 69
95	3,800 75	...	1 85	780 15	4,582 75	...
96	4,308 66	...	...	1,147 39	5,456 05	150 23
97	2,468 75	...	2 09	796 80	3,267 64	2,646 60
98	3,833 00	...	10 00	868 97	4,711 97	10 89
99	2,415 00	...	...	389 71	2,804 71	465 19
100	3,105 05	...	...	760 18	3,865 23	...
101	11,100 00	...	1,123 49	2,979 88	15,203 37	5,114 86
	385,251 51	40,776 02	7,770 73	158,611 94	592,410 20	52,376 48
1	1,727,960 48	194,496 15	35,563 25	452,759 14	2,410,779 02	720,950 11
2	663,429 33	87,130 80	16,193 68	250,104 89	1,016 858 70	8,188 67
3	385,251 51	40,776 02	7,770 73	158,611 94	592,410 20	52,376 48
4	2,776,641 32	322,402 97	59,527 66	861,475 97	4,020,047 92	781,515 26
5	2,747,159 98	426,421 97	57,699 78	811,952 16	4,043,233 89	787,025 87
6	29,481 34	...	1,827 88	49,523 81	...	...
7	...	104,019 00	...	...	23,185 97	5,510 61
8	69	8	1.5	21.5		

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VI.—TABLE F.—Roman

Counties. (Including incorporated villages, but not cities or towns.)	Number of schools.	Receipts. Legislative grants.	Receipts. School rate on supporters.	Receipts. Subscribed and from other sources.	Receipts. Total amount received.	Expendi[ture]. Teachers' salaries.	Expendi[ture]. Sites and building school houses.	Expendi[ture]. Maps, apparatus, prizes and libraries.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1 Bruce	10	428 00	5,560 70	2,365 35	8,354 05	4,515 00	825 82	23 02
2 Carleton	15	640 00	5,960 32	1,227 19	7,827 51	4,267 00	573 00	52 65
3 Essex	8	432 00	3,415 27	620 25	4,467 52	3,054 00	150 25	43 74
4 Frontenac	10	372 00	2,343 87	1,337 56	4,053 43	2,454 50	94 07	10 73
5 Grey	7	318 00	1,771 68	556 16	2,645 84	1,595 00	68 34	17 40
6 Hastings	7	283 00	1,618 89	571 30	2,473 19	1,543 50	306 90	3 60
7 Huron	6	253 00	2,236 78	370 30	2,860 08	1,885 00	45 06	15 52
8 Kent	5	249 00	2,011 58	1,118 29	3,378 87	1,634 50	324 50	16 20
9 Lambton	2	70 00	524 20	198 21	792 41	495 00	....	....
10 Lanark	3	143 00	601 07	332 99	1,077 06	675 00	7 25	26 33
11 Leeds and Grenville	5	223 00	1,206 85	486 82	1,916 67	1,280 00	2 00	....
12 Lennox and Addington	2	66 00	477 04	95 43	638 47	446 76	....	....
13 Lincoln	2	69 00	1,135 63	306 39	1,511 02	700 00	344 00	6 20
14 Middlesex	4	71 00	970 47	210 61	1,252 08	890 00	....	5 25
15 Norfolk	1	59 00	420 61	542 05	1,021 66	430 68	....	....
16 Northumberland	7	225 00	2,060 53	611 16	2,896 69	1,795 00	173 25	28 80
17 Ontario	1	89 00	54 68	847 61	991 29	625 00	100 00	....
18 Peel	1	39 00	155 00	41 00	235 00	210 00	....	....
19 Perth	4	102 00	1,269 51	252 78	1,624 29	1,045 00	4 08	35 50
20 Peterborough	1	20 00	223 22	26 33	269 55	200 00	....	....
21 Prescott and Russell	66	3,224 00	22,191 51	12,757 82	38,173 33	19,181 60	7,910 85	456 22
22 Renfrew	9	700 00	2,992 59	1,147 96	4,840 55	2,865 42	140 60	63 59
23 Simcoe	3	233 00	1,112 82	285 06	1,630 88	1,150 00	181 88	12 60
24 Stormont, Dundas and Glengarry	10	747 00	5,047 54	894 32	6,688 86	4,491 00	810 38	42 82
25 Waterloo	7	356 00	3,158 10	1,590 26	5,104 36	2,752 50	15 18	....
26 *Welland	1	21 00	....	....	21 00	21 00	....	....
27 Wellington	8	305 00	2,551 88	1,006 14	3,862 52	2,095 00	309 96	4 10
28 Wentworth	1	54 00	140 00	103 35	297 35	220 00	8 00	4 40
29 York	2	53 00	413 41	281 82	748 23	490 00	37 25	5 94
30 District Algoma	2	200 00	684 83	680 92	1,565 75	1,000 67	120 00	....
31 " Nipissing	12	1,073 00	3,052 5[illegible]	2,048 22	6,173 81	2,871 86	1,712 98	112 82
Total	222	11,117 00	75,362 67	32,918 65	119,398 32	66,879 99	14,265 60	987 43
Cities.								
1 Belleville	4	262 00	1,594 04	309 86	2,165 90	1,600 00	....	....
2 Brantford	2	248 00	1,513 40	388 00	2,149 40	1,166 83	428 22	6 58
3 Chatham	1	165 00	1,564 92	624 99	2,354 91	1,624 25	4 85	6 00
4 Guelph	3	260 00	2,909 74	159 99	3,329 73	1,700 00	....	117 00
5 Hamilton	8	922 00	11,434 10	2,216 77	14,572 87	5,209 00	1,846 45	1,233 48
6 Kingston	4	490 00	4,850 00	3,889 42	9,229 42	3,893 00	1,288 03	164 05
7 London	6	569 00	6,653 26	362 00	7,584 26	2,633 83	2,250 00	300 00
8 Ottawa	23	4,325 00	81,725 00	11,115 76	97,165 76	20,740 00	32,553 36	110 00
9 St. Catharines	3	235 00	3,778 82	205 65	4,219 47	1,991 64	1,332 50	7 70
10 St. Thomas	1	138 00	....	990 43	1,128 43	800 00	....	....
11 Stratford	1	288 00	2,378 33	615 81	3,282 14	1,300 00	800 00	44 00
12 Toronto	21	2,925 00	37,966 49	13,160 76	54,052 25	21,198 78	11,988 55	1,519 87
Total	77	10,777 00	156,368 10	34,039 44	201,184 54	63,856 33	52,491 96	3,508 68
Towns.								
1 Almonte	1	105 00	881 66	1,030 39	2,017 05	840 46	167 38	....
2 Amherstburg	1	161 00	801 08	1,971 36	2,933 44	1,357 00	128 24	14 94
3 Arnprior	2	178 00	2,965 21	85 50	3,228 71	1,664 66	144 00	4 50
4 Barrie	1	107 00	1,361 41	993 77	2,462 18	900 00	320 98	19 74
5 Berlin	1	229 00	2,475 15	641 48	3,345 63	1,400 00	515 10	46 29

* No

Catholic Separate Schools.

	ture.		Balan es.	Pupils.			Attendance.							
	All other purposes.	Total amount expended.		Number of pupils.	Boys.	Girls.	Average attendance.	Per cent. of average to total attendance.	Less than 20 days during the year.	21 to 50 days.	51 to 100 days.	101 to 150 days.	151 to 200 days.	201 days to whole year.
	$ c	$ c.	$ c.											
1	1,716 92	7,080 76	1,273 29	1,106	583	523	669	61	43	105	182	285	467	24
2	1,861 85	6.754 50	1,073 01	1,291	663	628	713	55	95	228	322	263	340	43
3	780 55	4,028 51	438 98	582	288	294	372	64	27	27	114	134	227	53
4	563 27	3,122 57	930 86	344	176	168	198	58	16	43	67	56	127	35
5	353 24	2,033 98	611 86	293	158	135	119	41	34	48	95	67	44	5
6	225 54	2,079 54	393 65	263	140	123	123	47	21	47	60	77	58	...
7	378 57	2,324 15	535 93	407	232	175	230	57	30	43	58	126	189	11
8	675 18	2,650 38	728 49	396	206	190	193	49	50	70	75	89	109	3
9	107 96	602 96	189 45	104	59	45	46	44	10	20	25	28	21	...
10	210 43	919 01	158 05	110	52	58	59	54	8	16	21	27	36	2
11	312 89	1,594 89	321 78	225	125	100	130	58	14	34	40	54	74	9
12	116 22	562 98	75 49	84	43	41	45	54	7	9	12	26	30	....
13	343 99	1,394 19	116 83	155	75	80	92	59	6	17	34	81	67	....
14	180 77	1.076 02	176 06	125	76	49	69	55	7	10	17	22	50	19
15	164 41	595 09	426 57	103	58	45	45	44	4	21	14	19	45	....
16	420 96	2,418 01	478 68	254	137	117	183	52	19	30	57	78	70	....
17	151 51	876 51	114 78	100	53	47	68	68	3	6	18	17	43	13
18	25 00	235 00	......	34	20	14	13	38	2	7	7	10	8	....
19	336 09	1,490 67	203 62	211	118	93	110	52	20	31	49	61	49	1
20	24 60	224 60	44 95	83	16	17	15	46	5	5	6	11	6	....
21	3,353 36	30,902 03	7,271 30	5,625	2,887	2,738	2,895	51	504	792	1,322	1,249	1,589	169
22	305 71	8,375 39	1,465 23	536	257	279	265	50	48	86	120	117	143	22
23	161 50	1,505 98	124 90	222	123	99	139	63	14	15	35	50	85	23
24	1,213 91	6,558 11	130 75	1,176	586	590	552	47	111	185	330	279	258	13
25	1,141 12	3,908 80	1,195 56	659	353	306	365	55	39	115	104	141	223	27
26	....	21 00	....	....	.....		.. ..	....	.....	...	......	......	......	....
27	788 76	3,197 82	664 70	403	204	199	244	61	26	36	81	98	154	8
28	24 95	257 35	40 00	27	14	13	11	41	1	6	10	4	6	....
29	131 31	664 50	83 73	105	48	57	55	53	9	19	20	27	30	....
30	122 76	1,243 43	322 32	200	111	89	92	46	19	35	51	85	50	10
31	549 94	5,247 60	926 21	655	321	334	284	43	121	110	159	132	125	8
	16,743 27	98,876 29	20517 03	15,828	8,182	7,646	8,314	53	1,313	2,216	3,505	3,618	4,673	508
1	462 22	2,062 22	103 68	405	230	175	250	62	11	28	165	92	109	....
2	470 30	2,071 43	77 97	321	155	166	231	72	4	16	23	67	211	....
3	602 24	2,237 34	117 57	345	183	162	215	62	24	30	56	83	152	....
4	857 38	2,674 38	655 35	412	224	188	315	77	7	28	41	124	212	....
5	4,815 30	13,104 23	1,468 64	1,639	772	867	1,170	71	40	95	239	276	989	....
6	3,769 00	9.114 08	115 34	793	395	398	564	71	14	41	115	180	443	....
7	1.916 62	7,099 95	484 31	764	411	353	570	75	4	60	109	141	450	....
8	37,867 61	91,270 97	5,894 79	5,487	2,842	2,645	3,622	66	106	458	1,314	1,153	2,461	....
9	867 54	4,199 38	20 09	354	198	156	231	65	4	24	64	96	166	....
10	320 63	1,120 63	7 80	202	109	93	169	83	.....	....	8	27	167	....
11	1,078 74	3.222 74	9 40	321	177	144	226	71	9	16	48	76	172	....
12	12,072 23	46,779 43	7,272 82	5,002	2,549	2,453	3,484	70	233	426	837	913	2,598	....
	65,099 81	184,956 78	16,227 76	16,045	8,245	7,800	11,047	69	456	1,217	3,019	3,228	8,125	
1	424 24	1,482 08	584 97	160	85	75	96	59	9	16	36	34	65	....
2	1,144 46	2,644 64	288 80	263	117	146	175	67	7	29	51	67	109	....
3	989 80	2,802 96	435 75	422	207	215	247	59	17	54	81	108	162	....
4	780 65	2,021 37	440 81	192	93	99	188	72	7	11	21	47	106	....
5	790 90	2,752 29	593 34	401	207	194	269	67	15	24	61	81	220	....

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VI.—TABLE F.—Roman

Towns.—*Continued.*	Number of schools.	Receipts. Legislative grants.	Receipts. School rate on supporters.	Receipts. Subscribed and from other sources.	Receipts. Total amount received.	Expendi[ture]. Teachers' salaries.	Expendi[ture]. Sites and building school houses.	Expendi[ture]. Maps, apparatus, prizes and libraries.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
6 Brockville	1	258 00	2,425 38	174 73	2,858 11	2,220 00	....	......
7 Cobourg	1	138 00	925 00	26 54	1,089 54	800 00	....	....
8 Cornwall	3	446 00	4,392 00	324 98	5,162 98	3,560 00	....	....
9 Dundas	1	133 00	835 00	315 37	1,283 37	700 00	....	....
10 Galt	1	55 00	459 95	77 23	592 18	325 00	132 97	10 60
11 Goderich	1	51 00	487 05	89 34	577 39	400 00	....	30 00
12 Ingersoll	1	77 00	897 41	....	974 41	575 00	10 00	3 25
13 Lindsay	2	251 00	2,096 82	1,590 01	3,937 83	2,110 00	....	....
14 *Mattawa	1	60 00	3,041 01	299 25	3,400 26	1,653 61	1,030 89	144 41
15 Newmarket	1	37 00	255 28	151 15	443 43	280 00	6 00	....
16 Niagara Falls	1	107 00	848 88	218 35	1,174 23	600 00	....	25 00
17 North Bay	2	89 00	1,300 00	384 09	1,773 09	1,024 98	260 11	50 00
18 Oakville	1	18 00	253 88	105 03	376 91	300 00	....	1 00
19 Orillia	1	105 00	1,650 97	1,467 38	3,223 35	1,375 00	339 00	....
20 Oshawa	1	51 00	387 60	116 30	554 90	420 00	....	....
21 Owen Sound	1	70 00	708 28	549 15	1,327 43	385 00	343 80	....
22 Paris	1	34 00	454 34	446 84	935 18	360 00	....	....
23 Parkhill	1	36 00	316 55	99 73	452 28	340 00	4 50	....
24 Pembroke	1	266 00	2,860 96	182 00	3,308 96	2,492 50	321 87	....
25 Perth	1	124 00	901 00	120 00	1,145 00	650 00	155 54	20 00
26 Peterborough	3	403 00	4,741 60	986 99	6,131 59	3,859 00	20 20	
27 Picton	1	27 00	245 00	991 20	1,263 20	350 00	....	22 69
28 Port Arthur	1	99 00	992 45	553 43	1,644 88	1,090 00	89 28	45 00
29 Prescott	1	148 00	863 00	677 86	1,688 86	1,100 00	....	....
30 Preston	1	In Co	400 14	322 24	722 38	300 00	146 95	....
31 Rat Portage	2	72 00	1,700 00	239 11	2,011 11	1,000 00	....	....
32 Renfrew	2	153 00	3,329 97	200 00	3,682 97	1,997 16	....	....
33 Sarnia	1	101 00	1,065 48	213 90	1,380 38	900 00	....	....
34 Sault Ste. Marie	1	62 00	899 55	288 75	1,250 30	823 00	87 50	12 00
35 St. Mary's	1	48 00	379 41	326 00	753 41	325 00	132 15	31 00
36 Sturgeon Falls	1	91 00	966 94	32 00	1,089 94	550 00	56 00	....
37 Sudbury	1	88 00	2,150 98	52 69	2,291 67	750 00	714 61	....
38 Thorold	1	74 00	1,000 00	461 96	1,535 96	700 00	431 89	15 00
39 Trenton	1	160 00	1,814 00	305 09	2,279 09	1,250 00	425 00	....
40 Vankleekhill	1	138 00	759 00	274 63	1,171 63	800 00	45 25	6 38
41 Walkerton	1	94 00	626 42	22 93	743 35	500 00	6 00	18 75
42 Wallaceburg	1	83 00	886 29	114 55	1,083 84	741 66	....	....
43 Waterloo	1	71 00	700 00	14 68	785 68	400 00	129 74	1 10
44 Whitby	1	34 00	225 00	219 95	478 95	265 00	....	..
Total	....	5,132 00	57,727 10	17,717 93	80,577 03	44,434 03	6,164 85	521 65
Totals.								
1 Counties, etc.	222	11,117 00	75,362 67	32,913 65	119,393 32	66,879 99	14,265 60	987 43
2 Cities	77	10,777 00	156,368 10	34,039 44	201,184 54	63,856 33	52,491 96	3,508 68
3 Towns	53	5,132 00	57,727 10	17,717 93	80,577 03	44,434 03	6,164 85	531 65
4 Grand Total, 1899	352	27,026 00	289,457 87	84,671 02	401,154 89	175,170 35	72,922 41	5,017 76
5 " 1898	345	26,538 85	231,969 86	130,676 15	389,184 86	167,671 21	103,085 92	5,598 37
6 Increase	7	487 15	57,488 01	....	11,970 03	7,499 14	....	....
7 Decrease	....	....	....	46,005 13	....	....	30,163 51	580 61
8 Percentage	....	7	72	21	....	50	21	1
Cost per pupil—								
1 Counties	....	6 25						
2 Cities	....	11 58						
3 Towns	....	6 87						
4 Province	....	8 42						

* No report received; statistics for preceding year.

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Catholic Separate Schools

	ture.			Pupils.			Attendance.							
	All other purposes.	Total amount expended.	Balances.	Number of pupils.	Boys.	Girls.	Average attendance.	Per cent. of average to total attendance.	Less than 20 days during the year.	21 to 50 days.	51 to 100 days.	101 to 150 days.	151 to 200 days.	201 days to whole year.
	$ c.	$ c.	$ c.											
6	600 34	2,820 34	37 77	397	183	214	301	76	8	17	41	85	246	....
7	272 98	1,072 98	16 56	228	115	113	147	65	7	21	40	49	111	....
8	1,571 47	5,131 47	31 51	919	444	475	577	63	43	94	219	243	320	....
9	241 85	941 85	341 52	233	135	98	158	68	3	16	42	33	139	....
10	54 60	523 17	69 01	94	49	45	70	75	2	3	10	19	59	1
11	78 69	508 69	68 70	77	39	38	63	82	......	......	3	14	60	....
12	385 08	973 33	1 08	104	46	58	70	67	1	11	15	23	54	....
13	510 47	2,620 47	1,317 86	372	158	214	248	67	6	15	67	91	193	....
14	564 05	3,392 96	7 30	284	152	132	164	58	9	25	75	60	115	....
15	37 48	323 48	119 95	80	43	37	47	59	9	6	13	20	32	....
16	273 98	898 98	275 25	160	78	82	110	69	9	8	17	39	87	....
17	327 41	1,662 50	110 59	215	113	102	126	59	3	19	44	68	86	....
18	53 94	354 94	21 97	39	21	18	23	59	......	6	10	8	15	....
19	289 48	2,003 48	1,219 87	214	103	111	169	79	1	7	15	47	144	....
20	134 90	554 90	....	99	51	48	62	63	2	11	21	17	48	....
21	107 67	836 47	490 96	129	73	56	73	57	2	8	45	30	43	1
22	148 71	508 71	426 47	65	32	33	44	68	1	4	10	23	27	....
23	107 78	452 28	.... ..	70	28	42	43	61	3	7	12	21	27	....
24	455 57	3,269 94	39 02	565	322	243	359	64	19	53	100	135	258	....
25	295 00	1,120 54	24 46	227	118	109	156	69	10	13	29	68	107	....
26	1,192 35	5,071 55	1,060 04	764	397	367	526	69	10	42	108	166	436	....
27	157 43	530 12	733 08	44	27	17	28	64	4	1	8	9	22	....
28	406 76	1,631 04	13 84	169	94	75	113	67	8	8	28	38	87	....
29	588 86	1,688 86	....	219	116	103	155	70	9	17	20	41	132	. ..
30	82 78	529 73	192 65	82	42	40	59	72	2	6	2	25	47	....
31	515 25	1,515 25	495 86	269	136	133	162	60	7	21	69	64	108	....
32	929 15	2,926 31	756 66	335	164	171	204	61	14	31	65	73	152	....
33	270 91	1,170 91	209 47	198	87	111	121	61	8	5	30	80	122	8
34	179 00	1,101 50	148 80	170	85	85	100	59	21	25	34	38	52	....
35	172 95	661 10	92 31	68	33	35	49	72	2	3	9	19	35	....
36	176 41	782 41	307 53	180	91	89	76	42	19	27	69	34	31	....
37	376 94	1,841 45	450 22	264	135	129	115	44	34	33	69	60	68	. ..
38	184 82	1,331 71	204 25	114	51	63	73	64	4	13	19	19	59	....
39	467 30	2,142 30	136 79	251	109	142	190	76	.....	23	23	62	143	....
40	....	851 63	320 00	262	107	155	137	82	13	44	57	72	76	....
41	160 47	685 22	58 13	203	102	101	141	70	3	16	27	43	114	...
42	202 53	944 19	139 65	148	74	74	78	53	5	24	63	34	22	....
43	213 86	744 70	40 98	121	62	59	80	66	7	10	20	27	57	....
44	138 82	403 82	75 13	53	26	27	35	66	......	4	14	12	23	. ..
	17,058 09	68,178 62	12,398 41	9,923	4,950	4,973	6,376	64	363	831	1,812	2,293	4,619	5
1	16,743 27	98,876 29	20,517 03	15,828	8,182	7,646	8,344	53	1,313	2,216	3,505	3,613	4,673	508
2	65,[illegible]99 81	184,956 78	[illegible]6 227 76	16,045	8,24[illegible]	7,800	11,047	69	456	1,217	3,019	3,228	8,125	..
3	17,058 09	68,178 62	12,398 41	9,923	4,950	4,973	6,376	64	363	831	1,812	2,293	4,619	5
4	98 901 17	352,011 69	49,143 20	41,796	21,377	20,419	25,767	62	2,132	4,264	8,336	9,134	17,417	513
5	73,125 89	349,481 39	39,703 47	41,667	21,249	20,418	25,671	62	2,142	4,380	7,899	8,999	17,553	694
6	25.775 28	2,530 30	9,439 73	129	128	1	96	......	....	......	437	135		....
7	....	....	....	... .	.....	.....	.....	.....	10	116	......	......	136	181
8	28	....	....	.....	51	49	.....	.....	5	10	20	22	42	'1

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VII.—TABLE G.—The Roman

Counties. (Including incorporated villages, but not cities or towns.	Teachers.					Number in the					
	Number of teachers.	Male.	Female.	Average salary, male.	Average salary, female.	Reading.	Writing.	Arithmetic.	Drawing.	Geography.	Music.
				$	$						
1 Bruce	18	5	13	372	198	1,106	1,106	1,106	1,093	827	968
2 Carleton	22	1	21	230	197	1,291	1,288	1,288	1,044	601	576
3 Essex	12		12	.....	246	582	582	582	582	487	480
4 Frontenac	10	3	7	210	241	344	344	344	339	253	218
5 Grey	7	1	6	220	224	293	283	293	298	206	29
6 Hastings	7	....	7	.....	232	263	263	263	255	156	163
7 Huron	7	2	5	280	267	407	407	396	351	297	209
8 Kent	7	....	7	.....	230	396	396	396	360	336	346
9 Lambton	2	1	1	260	235	104	104	104	104	63	....
10 Lanark	3	....	3	.....	225	110	110	110	100	72	91
11 Leeds and Grenville	7	2	5	195	210	225	207	222	198	136	78
12 Lennox & Addington	2	1	1	240	225	84	84	84	67	48	....
13 Lincoln	3	....	3	.....	233	155	155	155	155	108	93
14 Middlesex	4	1	3	190	233	125	123	123	118	89	46
15 Norfolk	1	....	1	.....	260	103	103	103	103	103	103
16 Northumberland	7	1	6	350	235	254	253	253	236	205	30
17 Ontario	2	1	1	400	225	100	100	100	98	98	....
18 Peel	1	....	1	.....	210	34	34	34	27	17	....
19 Perth	4	2	2	273	250	211	208	211	164	125	51
20 Peterborough	1	....	1	.....	200	33	33	33	29	22	....
21 Prescott & Russell	82	17	65	256	216	5,625	5,505	5,528	3,848	2,552	1,160
22 Renfrew	13	1	12	200	218	536	532	519	418	331	185
23 Simcoe	6	1	5	390	152	222	222	222	222	208	....
24 Stormont, Dundas & Glengarry	20	1	19	450	204	1,176	1,081	1,110	825	477	167
25 Waterloo	12	2	10	305	214	659	659	659	631	382	530
26 Wellington	9	....	9	.....	233	403	401	402	399	336	291
27 Wentworth	1	....	1	.....	200	27	27	27	27	19	27
28 York	2	....	2	.....	208	105	105	105	105	61	71
29 District Algoma	4	1	3	325	183	200	129	128	52	39	61
30 District Nipissing	14	4	10	269	207	655	606	621	321	195	67
Total	290	48	242	277	216	15,828	15,450	15,521	12,064	8,848	6,040
Cities.											
1 Belleville	6	1	5	600	200	405	405	405	405	236	....
2 Brantford	5	..	5	...	222	321	321	321	321	258	258
3 Chatham	6	1	5	500	225	345	345	345	345	345	345
4 Guelph	8	...	8	..	213	412	412	412	412	320	412
5 Hamilton	38	...	38	.....	185	1,639	1,639	1,639	1,639	1,639	....
6 Kingston	15	2	13	550	225	793	793	793	793	634	438
7 London	16	....	16	..	164	764	764	764	764	764	764
8 Ottawa	90	8	82	594	197	5,487	5,487	5,487	5,161	3,606	4,547
9 St. Catharines	9	1	8	500	191	354	354	354	354	336	333
10 St. Thomas	4	....	4	.....	200	202	202	202	202	202	202
11 Stratford	6	....	6	..	217	321	321	321	321	321	321
12 Toronto	94	26	68	300	200	5,002	5,002	5,002	5,002	4,463	4,942
Total	297	39	258	391	190	16,045	16,045	16,045	15,719	13,124	12,562
Towns.											
1 Almonte	3	1	2	425	200	160	160	160	160	89	160
2 Amherstburg	5	1	4	600	200	263	263	263	263	197	263
3 Arnprior	6	1	5	550	200	422	472	422	422	422	367
4 Barrie	4	....	4	.....	225	192	192	192	192	144	192
5 Berlin	8	....	8	.....	200	401	401	401	401	279	401

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Catholic Separate Schools.

	different branches of instruction.											Maps and prizes.		Arbor Day.
	Grammar and Composition.	English History.	Canadian History.	Temperance and Hygiene.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.	Number of maps.	Number of schools giving prizes.	Number of trees planted on Arbor Day.
1	579	152	314	327	736	14	5	5	....	....	56	68	7	23
2	517	103	302	412	421	18	15	15	....	4	50	78	8	17
3	274	89	171	199	480	22	12	12	4	1	32	70	6	20
4	275	132	180	136	321	9	9	7	2	....	59	61	1	8
5	184	65	112	108	121	12	12	12	....	....	19	37	1	10
6	164	60	117	116	205	6	6	6	....	....	42	46	1	....
7	239	135	201	164	265	20	20	20	....	....	133	49	2	....
8	358	97	120	107	244	21	21	21	9	2	22	37	1	10
9	96	44	61	61	21	7	7	7	..	....	30	19	2	2
10	72	24	36	31	39	....	....	....	....	....	....	26	....	6
11	162	69	106	91	162	18	13	18	18	9	5	48	1	5
12	48	17	31	24	30	....	....	....	....	....	....	15	1	....
13	129	26	57	41	93	....	....	....	....	....	....	20	....	....
14	87	38	50	67	85	6	6	6	....	....	76	86	2	4
15	41	24	24	24	103	7	....	....	....	....	....	4	....	1
16	170	61	83	79	166	8	8	8	....	....	14	54	2	....
17	74	37	58	58	....	17	18	18	....	13	....	11	....	....
18	17	8	12	8	....	....	....	....	....	....	....	9	....	....
19	139	48	54	32	59	7	7	7	3	3	44	87	1	4
20	18	6	16	6	....	....	....	....	....	..	1	7	....	....
21	2,257	184	683	1,349	1,905	118	13	7	2	....	45	321	40	41
22	272	141	181	247	287	46	38	36	7	37	27	85	2	14
23	195	35	62	52	165	10	10	10	....	....	43	18	1	6
24	787	159	272	180	610	23	16	16	10	....	....	64	5	12
25	366	97	208	99	542	20	1	1	....	....	56	61	2	71
26	242	149	178	229	269	11	11	11	....	....	95	70	....	12
27	19	8	10	4	....	2	2	2	....	....	8	7	....	....
28	76	18	13	6	71	....	....	....	....	....	....	9	1	....
29	39	2	18	....	....	1	....	....	....	...	....	12	2	....
30	189	71	81	102	116	7	6	5	....	....	19	53	9	....
	8,085	2 094	3,801	[illegible]	7,516	425	251	240	50	69	876	1,882	98	266
1	236	68	159	159	405	....	....	....	....	....	....	30	....	....
2	213	60	133	213	321	....	....	....	...	....	....	18	2	....
3	127	80	127	191	191	....	....	....	....	....	....	10	....	....
4	268	62	171	171	412	....	....	....	....	....	....	42	3	....
5	1,639	277	554	1,639	1,639	66	66	66	66	14	....	114	8	....
6	793	160	361	361	793	33	33	33	33	33	....	50	....	....
7	764	117	266	764	764	117		....	....	....	..	35	...	6
8	3,021	586	2,418	1,217	4,202	132	90	85	61	....	117	200	23	47
9	252	96	161	252	354	....	...	....	....	....	....	28	....	....
10	202	66	66	118	202	....	....	..	....	....	....	8	1	....
11	321	99	99	99	321	....	.	....	. .	...	....	23	....	.. ..
12	4,463	773	1,518	806	5,002	213	260	181	157	42	....	374	....	....
	12,299	2,444	6,028	5,990	14,606	561	449	365	317	89	117	922	37	53
1	89	41	89	41	160	....	....	....	....	....	....	12	....	....
2	112	54	112	54	263	19	16	16	7	....	....	29	1	....
3	422	55	55	55	367	....	....	....	...	....	....	8	2	....
4	123	83	83	83	....	....	....	....	....	....	....	16	....	24
5	153	58	158	158	401	....	....	....	...	....	....	25	1	....

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VII.—TABLE G.—The Roman

Towns.—*Con.*	Teachers.					Number in the					
	Number of Teachers.	Male.	Female.	Average salary, male.	Average salary, female.	Reading.	Writing.	Arithmetic.	Drawing.	Geography.	Music.
				$	$						
6 Brockville	9	1	8	675	244	397	397	397	397	397	214
7 Cobourg	4	....	4	......	200	228	228	228	228	155	228
8 Cornwall	14	1	13	720	219	919	919	919	919	315	475
9 Dundas	4	....	4	......	175	233	233	233	233	233	233
10 Galt	1	....	1	......	325	94	94	94	94	57	94
11 Goderich	2	....	2	......	200	77	77	77	77	62	77
12 Ingersoll	2	....	2	......	288	104	104	104	104	73	104
13 Lindsay	7	1	6	600	248	372	372	372	372	372	372
14 *Mattawa	5	1	4	650	225	284	284	284	284	284	284
15 Newmarket	1	1	...	280	.....	80	80	80	80	32	......
16 Niagara Falls	3	....	3	......	200	160	160	160	160	117	160
17 North Bay	3	....	3	......	341	215	215	215	215	140	113
18 Oakville	1	....	1	......	300	39	39	39	39	39	......
19 Orillia	4	....	4	......	350	214	214	214	214	214	214
20 Oshawa	2	....	2	......	200	99	99	99	99	62	99
21 Owen Sound	2	....	2	..	193	129	129	129	129	129	129
22 Paris	2	....	2	......	180	65	65	65	65	65	65
23 Parkhill	1	....	1	....	340	70	70	70	70	42	70
24 Pembroke	9	1	8	600	237	565	565	565	565	325	164
25 Perth	4	....	4	......	200	227	227	227	227	227	227
26 Peterborough	14	1	13	800	237	764	764	764	764	465	764
27 Picton	1	1	....	350	.....	44	44	44	44	44	....
28 Port Arthur	3	....	3	......	300	169	169	169	169	149	169
29 Prescott	4	1	3	500	200	219	219	219	219	141	219
30 Preston	1	....	1	....	300	82	82	82	82	82	......
31 Rat Portage	6	....	6	......	167	269	269	269	187	269	269
32 Renfrew	6	1	5	540	230	335	335	335	288	176	274
33 Sarnia	4	....	4	......	225	198	198	198	198	160	......
34 Sault Ste. Marie	3	....	3	......	267	170	170	170	170	71	170
35 St. Mary's	1	....	1	......	325	68	68	68	68	48	68
36 Sturgeon Falls	2	....	2	......	275	180	180	180	180	75	......
37 Sudbury	3	....	3	......	250	264	264	264	264	264	264
38 Thorold	3	....	3	......	233	114	114	114	114	114	114
39 Trenton	5	....	5	......	250	251	251	251	251	123	251
40 Vankleekhill	6	....	6	......	133	262	262	257	257	250	262
41 Walkerton	4	....	4	......	125	203	203	203	203	203	203
42 Wallaceburg	2	1	1	500	300	148	148	148	148	115	......
43 Waterloo	2	....	2	......	200	121	121	121	121	121	121
44 Whitby	1	....	1	......	265	53	53	53	53	39	......
Total	177	14	163	556	226	9,923	9,923	9,918	9,789	7,380	7,853
Totals.											
1 Counties, etc	290	48	242	277	216	15,828	15,450	15,521	12,064	8,848	6,040
2 Cities	297	39	258	391	190	16,045	16,045	16,045	15,719	13,124	12,562
3 Towns	177	14	163	556	226	9,923	9,923	9,918	9,789	7,380	7,853
4 Grand total, 1899	764	101	663	360	208	41,796	41,418	41,484	37,572	29,352	26,455
5 Grand total, 1898	744	87	657	372	212	41,667	41,473	41,396	37,345	29,578	25,322
6 Increase	20	14	6	......	......	129	....	88	227	....	1,133
7 Decrease	....	.. ..	...	12	4	....	55	....	....	226	....
8 Percentage	....	13	87	......	......	100	100	100	90	70	63

* No report received; statistics for preceding year.

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Catholic Separate Schools.

	different branches of instruction.											Maps and prizes.		Arbor Day.
	Grammar and Composition.	English History.	Canadian History.	Temperance and Hygiene.	Drill and Calisthenics.	Boookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.	Number of maps.	Number of schools giving prizes.	Number of trees planted on Arbor Day.
6	397	131	170	86	397	......	......	....	....	....	......	30	1	......
7	228	84	71	71	228	......	......	....	....	....	......	9	......	......
8	315	80	190	80	475	......	......	....	....	....	......	16	......	......
9	233	74	74	233	......	......	......	....	....	....	......	30	......	......
10	72	15	30	15	94	......	......	....	....	....	......	6	......	......
11	38	38	38	62	77	......	......	....	....	....	......	8	1	......
12	65	35	65	85	104	......	......	....	....	....	......	10	......	......
13	372	112	170	83	372	......	27	27	....	10	......	20	......	......
14	234	46	76	36	111	8	16	16	....	8	....	20	1	......
15	46	19	32	32	80	......	......	....	....	....	......	10	......	......
16	117	40	65	65	160	......	...	....	....	....	......	14	......	......
17	140	55	89	35	102	......	......	....	....	....	...	14	......	......
18	28	12	17	17	89	......	......	....	....	....	......	6	1	......
19	110	63	110	140	214	......	......	....	....	....	......	9	......	......
20	99	20	38	20	99	......	......	....	....	....	......	5	......	......
21	129	52	52	129	129	......	......	....	....	....	......	9	1	......
22	56	33	83	65	65	......	......	....	....	....	12	5	1	......
23	42	11	11	27	70	......	......	...	....	....	......	9	1	......
24	565	104	177	104	......	......	......	....	....	....	....	30	1	......
25	227	92	92	123	227	......	......	....	....	....	......	5	......	......
26	531	142	229	434	764	......	......	....	....	....	......	44	......	......
27	27	13	20	13	......	......	......	....	...	....	......	9	......	......
28	126	74	104	104	169	......	......	....	....	....	......	15	1	.
29	170	49	100	100	219	......	....	....	....	....	....	15	...	......
30	69	14	34	34	82	......	......	....	....	....	....	8	..	......
31	177	114	114	140	......	......	......	....	....	....	....	10	2	......
22	259	107	138	107	......	......	......	....	....	....	......	21	2	......
33	135	47	66	47	198	......	......	....	....	...	......	17	......	
34	49	22	49	22	170	......	......	....	....	....	......	8	1	......
35	35	14	35	35	......	......	......	....	....	....	....	10	......	......
36	22	9	22	......	......	......	......	....	....	....	......	6	......	......
37	264	55	55	55	264	3	1	1	....	..	13	6	......	......
38	114	34	58	34	114	......	......	....	...	....	....	7	......	......
39	123	30	74	74	251	......	......	....	....	....	......	17	1	......
40	240	32	88	32	262	12	7	8	....	....	....	13	...	6
41	203	45	86	203	203	......	......	....	....	....	......	15	1	2
42	63	34	29	34	......	10	10	10	....	...	......	8	..	...
43	41	14	41	14	......	......	....	....	....	....	......	12	1	......
44	39	23	23	12	......	......	......	....	....	....	......	12	......	......
	7,109	2,229	3,462	3,343	6,930	52	77	78	7	18	25	608	21	32
1	8,085	2,094	3,801	4,359	7,516	425	251	240	50	69	876	1,382	98	266
2	12,299	2,444	6,028	5,990	14,606	561	449	365	317	89	117	922	37	53
3	7,109	2,229	3,462	3,343	6,930	52	77	78	7	18	25	608	21	32
4	27,493	6,767	13,291	13,692	29,052	1,038	777	683	374	176	1,018	2,912	156	351
5	24,138	6,508	14,057	17,964	25 779	1,266	862	844	206	185	94	2,888	101	336
6	3,355	259	......	......	3,273	......		....	169	....	924	24	55	15
7	......	......	766	4,272	......	228	85	161	....	9	......	......	....	......
8	66	16	32	33	70	2	2	2	1	.4	2	7	.37	1

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VIII.—TABLE H.—The

Collegiate Institutes.	Receipts. Legislative grants.	Municipal grants (county)	Municipal grants (local).	Fees.	Balances and other sources.	Total receipts.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1 Aylmer	868 96	900 00	1,250 00	772 00	1,164 50	4,955 46
2 Barrie	1,076 39	934 00	933 37	1,584 50	3,072 72	7,600 98
3 Brantford	1,314 25	....	7,000 00	2,625 90	125 32	11,065 47
4 Brockville	1,112 48	1,277 00	6,300 00	33 00	2,234 68	10,957 16
5 Chatham	1,255 25	999 01	5,475 00	1,059 80	726 44	9,515 50
6 Clinton	966 16	1,612 55	1,400 00	1,011 00	991 53	5 981 24
7 Cobourg	940 55	940 55	3,500 00	1,005 00	10,343 26	16,729 36
8 Collingwood	909 84	909 84	2,060 00	860 00	209 92	4,889 60
9 Galt	1,208 25	1,208 25	3,568 00	1,973 00	1,255 58	9,213 08
10 Goderich	1,106 27	1,231 03	2,400 00	1,429 50	1,335 81	7,502 61
11 Guelph	1,158 47	....	5,485 54	786 65	347 46	7,778 12
12 Hamilton	*4,355 77	....	23,220 51	4,745 50	....	32,321 78
13 Ingersoll	981 13	933 13	2,818 92	713 00	238 08	5,684 26
14 Kingston	1,221 87	....	7,150 00	4,148 00	35 40	12,555 27
15 Lindsay	1,272 16	2,453 10	2,659 15	1,483 75	139 49	8,007 65
16 London	1,435 68	....	25,219 75	2,120 00	1,714 71	30,490 14
17 Morrisburg	1,070 17	2,215 14	2,065 75	767 00	2,340 17	8,458 23
18 Napanee	1,062 76	3,000 00	2,600 00	169 70	683 60	7,516 06
19 Niagara Falls	1,056 17	3,237 25	3,900 00	....	454 13	8,647 55
20 Ottawa	1,295 95	....	9,020 00	7,143 50	2,970 11	20,429 56
21 Owen Sound	1,200 38	3,473 60	4,512 50	2,033 50	474 72	10,694 70
22 Perth	971 09	2,148 29	2,572 76	433 50	335 43	6,461 07
23 Peterborough	1,235 01	7,000 00	....	2,214 00	172 02	10,621 03
24 Ridgetown	993 69	1,911 50	950 00	1,075 70	955 33	5,886 22
25 Sarnia	1,087 89	1,841 14	4,139 26	118 00	1,018 40	8,204 69
26 Seaforth	995 71	1,767 15	1,800 00	1,279 60	1,231 73	7,074 19
27 Stratford	1,187 79	1,300 00	5,500 00	1,662 50	280 16	9,930 45
28 Strathroy	977 74	1,935 09	2,400 00	1,073 00	120 65	6,506 48
29 St. Catharines	1,176 66	....	5,449 39	248 00	1,766 75	8,640 80
30 St. Mary's	954 11	799 20	2,650 00	1,177 50	218 21	5,799 02
31 St. Thomas	1,295 38	2,361 11	5,012 47	702 00	50 00	9,420 96
32 Toronto (Harbord)	1,862 11	....	11,670 66	7,227 00	2,502 06	22,761 83
33 " (Jameson)	1,334 04	....	11,670 66	4,009 00	2,011 06	19,024 76
34 " (Jarvis)	1,345 95	....	11,670 66	4,728 00	3,201 81	20,946 42
35 Whitby	831 82	1,392 56	2,400 00	425 00	213 82	5,263 20
36 Windsor	1,164 63	1,251 04	6,128 59	....	149 99	8,694 25
37 Woodstock	1,235 75	2,012 75	3,600 00	1,861 00	1,516 95	10,226 45
1 Total, 1899	45,018 28	50,044 28	200,092 94	64,298 10	46,602 00	406,455 60
2 " 1898	41,923 59	45,596 86	215,210 77	66,587 81	49,164 60	418,483 63
3 Increase	3,094 69	4,447 42	....	....	....	....
4 Decrease	....	....	15,117 83	1,889 71	2,562 60	12,028 03
5 Percentage	11	12	49	16	12	....
6 Cost per pupil	$34 22					

* Of this amount, $3,000 was Annual and Special

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Collegiate Institutes.

	Expenditure.						
	Teachers' salaries.	Building, rent and repairs.	Maps, apparatus, prizes and libraries.	Fuel, books and contingencies and other expenses.	Total expenditure.	Balances.	Charges per year.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
1	3,799 70	411 62	....	744 14	4,955 46	....	Form I., $5; others $10.
2	5,691 65	127 65	35 99	988 20	6,843 49	757 49	$10.
3	8,691 64	224 71	....	2,149 12	11,065 47	....	Res., $10; non-res., $16.
4	6,583 32	94 31	65 57	2,087 76	8,830 96	2,126 20	Res., free; Co. pupils, $2.50.
5	7,450 00	393 88	384 87	1,286 75	9 515 50	....	City, $6; Co. $10.
6	4,676 25	243 06	....	544 65	5,463 96	517 28	$6; $8; $10.
7	5,104 65	101 70	142 71	11,150 40	16,499 46	229 90	Res., $12; non-res., $14; Co., $7.50.
8	3,998 04	174 42	47 70	669 44	4,889 60	....	Town, 75c. per mo.; Co. $1 per mo; outside, $1.50 per mo.
9	7,000 00	194 77	....	1,988 25	9,183 02	30 06	Co., $10; others $14.
10	5,284 50	....	5 96	718 85	6,009 30	1,493 31	Co., $6, $8, $10; res., $5, $7, $10; non-res., $8, $10, $12.
11	5,758 00	244 46	96 03	1,490 95	7,589 44	188 68	Res., free; non-res, $20.
12	17,148 00	655 50	....	14,518 28	32,321 78	....	Res. $2.50, Form I.; others, $10; non-res., $20.
13	4,725 00	18 75	214 00	615 08	5,572 83	111 48	$7.50.
14	10,349 99	287 64	126 75	1,707 22	12,471 60	83 67	Res., $10, $15; non-res., $20, $25; com'l., $5.
15	6,570 29	189 47	107 18	1,134 45	8,001 39	6 26	$7.50; $10; $20.
16	22,530 00	1,267 39	294 69	5,774 35	29,866 43	623 71	Free, Form I., city; city and Co. $10; outside Cos., $30.
17	4,688 54	636 84	7 00	497 56	5,829 94	2,628 29	Res., free; others $6.
18	5,240 45	247 52	4 32	1,023 59	6,515 88	1,000 18	Res., free; non-res., $10.
19	5,031 00	361 02	19 83	1,292 98	6,704 83	1,942 72	Free.
20	15,360 00	300 33	335 10	3,075 12	19,070 55	1,859 01	Res., Forms I., II., $20; non-res., $30; res., Forms III., IV., $25; non-res., $35.
21	8,760 00	46 58	157 51	1,431 22	10,395 31	299 39	Free, Form I.; res., Forms II.-IV., $8 to $12; Co., $10; non-res., $10 to $15.
22	4,771 00	53 41	....	806 44	5,630 85	830 22	Res., free; non-res., $16; Co., $10.
23	7,723 50	1,100 00	20 00	1,564 80	10,408 30	212 73	Res, $10; non-res., $25.
24	4,485 35	98 80	44 75	1,170 78	5,799 68	86 54	Res., $6; non-res., $10; Co., $10.
25	5,170 00	....	....	1,561 84	6,731 84	1,472 85	Free.
26	4,831 65	29 17	42 43	881 84	5,785 09	1,289 10	$6, Form I.; $8, Form II.; $10, Form III., IV.
27	7,296 95	588 24	57 46	1,556 46	9,499 11	431 34	$10.
28	5,290 00	45 20	60 50	1,095 50	6,491 20	15 28	$10; town pupils, Form I., free.
29	7,262 79	158 12	....	1,211 66	8,682 57	8 23	Res., free; outsiders $16.
30	4,500 00	361 72	45 74	702 37	5,609 83	189 19	Town, $5; Co., $10; outside, $15.
31	7,870 00	20 70	10 00	1,520 26	9,420 96	....	Co., $10; other Cos., $30; city, Forms II., III., IV., $10.
32	17,358 00	329 22	244 77	4,829 84	22,761 83	....	$6 to $32.
33	14,076 00	682 43	156 40	4,109 93	19,024 76	....	Form I., $6 to $13; Form II., $7 to $23; Form III., IV., $32.
34	15,798 00	427 87	234 80	4,485 75	20,946 42	....	$16; $23; $32; with reduction for pupils not taking languages.
35	4,380 30	....	10 95	796 48	5,187 73	75 47	Town, $6; Co., $7.50; outsiders $10.
36	6,534 41	437 75	301 95	1,420 14	8,694 25	....	Free.
37	7,100 00	797 66	32 96	1,093 99	9,024 61	1,201 84	Res., $7.50; non-res., $10; Co., $7.50.
1	288,888 97	11,351 91	3,307 91	83,696 44	387,245 23	19,210 37	9 free. 28 fee.
2	289,231 94	29,621 85	3,829 01	77,575 58	400,258 33	18,225 30	9 free. 28 fee.
3	....	....	....	6,120 91	....	985 07	
4	342 97	18,269 94	521 10	....	13,013 10	....	
5	74	3	1	22			

Grants re Ontario Normal College.

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VIII.—TABLE H.—The

	High Schools.	Receipts.					
		Legislative grants.	Municipal grants (county).	Municipal grants (local).	Fees.	Balances and other sources.	Total receipts.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	Alexandria	605 27	605 27	2,134 00	....	1,147 07	4,491 61
2	Almonte	679 05	679 05	2,337 84	292 00	269 07	4,257 01
3	Arnprior	556 13	556 13	2,128 44	118 75	276 56	3,636 01
4	Arthur	599 05	599 05	375 00	715 60	492 65	2,781 35
5	Athens	704 15	1,677 62	1,300 00	84 00	1,410 91	5,176 68
6	Aurora	599 61	700 00	750 00	571 00	224 68	2,845 29
7	Beamsville	477 38	477 38	825 00	33 00	1,731 64	3,544 40
8	Belleville	842 57	424 00	3,478 66	228 00	....	4,973 23
9	Berlin	771 08	1,630 53	7,500 00	1,048 75	618 82	11,569 18
10	Bowmanville	774 74	774 74	1,160 00	477 00	1,445 23	4,631 71
11	Bradford	600 30	1,035 30	500 00	526 00	1,983 53	4,645 13
12	Brampton	829 11	1,759 11	1,700 00	1,455 00	86 04	5,829 26
13	Brighton	457 72	457 72	1,400 00	112 40	286 27	2,714 11
14	Caledonia	574 11	1,074 11	600 00	495 00	1,052 55	3,795 77
15	Campbellford	677 25	677 25	1,747 06	563 85	2,033 12	5,698 53
16	Carleton Place	679 00	679 00	1,500 00	314 00	2,057 04	5,229 04
17	Cayuga	559 34	1,234 96	500 00	303 00	740 30	3,337 60
18	Colborne	449 14	448 58	900 00	173 25	1,604 13	3,575 10
19	Cornwall	847 06	1,665 60	2,815 96	105 00	2,450 13	7,883 75
20	Deseronto	621 22	621 22	2,100 00	249 50	360 30	3,952 24
21	Dundas	641 83	1,843 44	739 17	617 00	187 61	4,029 05
22	Dunnville	620 79	1,645 58	1,400 00	369 00	....	4,035 37
23	Dutton	514 93	778 32	....	689 05	1,307 24	3,289 54
24	Elora	545 75	702 75	850 00	509 00	58 06	2,665 56
25	Essex	728 94	1,715 93	300 00	13 00	624 28	3,382 15
26	Fergus	614 41	807 66	1,100 00	68 00	650 36	3,240 43
27	Forest	560 04	1,198 73	500 00	249 00	824 43	3,332 20
28	Gananoque	649 13	849 13	1,719 43	43 53	46 75	3,307 97
29	Georgetown	653 92	711 80	1,118 31	762 52	....	3,246 55
30	Glencoe	667 76	1,038 05	900 00	701 50	73 31	3,380 62
31	Gravenhurst	972 24	....	1,133 32	458 50	26 20	2,590 26
32	Grimsby	427 30	505 53	350 00	44 00	203 98	1,530 81
33	Hagersville	629 86	1,312 05	550 00	194 00	1,032 00	3,717 91
34	Harriston	683 43	683 43	1,500 00	1,027 00	458 99	4,352 85
35	Hawkesbury	561 93	1,161 93	1,100 00	39 00	122 62	2,985 48
36	Iroquois	725 54	1,493 47	1,282 50	526 00	995 38	5,022 89
37	Kemptville	702 97	902 97	1,250 89	850 00	5 00	3,711 83
38	Kincardine	794 17	1,456 94	2,100 00	775 50	166 82	5,293 43
39	Leamington	666 36	1,204 96	1,460 00	64 00	378 65	3,773 97
40	Listowel	631 26	800 00	800 00	743 00	124 13	3,098 39
41	Lucan	621 17	1,010 46	300 00	831 00	247 95	3,010 58
42	Madoc	481 17	803 15	500 00	691 48	495 47	2,971 27
43	Markham	703 48	1,292 28	400 00	1,302 00	290 31	3,988 07
44	Meaford	768 60	1,316 35	1,150 00	802 00	140 08	4,177 03
45	Mitchell	634 16	800 00	1,850 00	306 00	645 88	4,236 04
46	Mount Forest	707 44	657 44	1,400 00	674 50	578 35	4,017 73
47	Newburgh	528 98	1,650 00	346 50	66 00	126 51	2,717 99
48	Newcastle	463 28	463 28	1,000 00	81 00	....	2,007 56
49	Newmarket	646 24	700 00	1,100 00	592 00	1,480 99	4,519 23
50	Niagara	435 97	435 97	550 00	....	120 30	1,542 24
51	Niagara Falls South	594 30	594 30	439 58	43 00	1,194 43	2,865 61
52	Norwood	620 41	737 98	1,834 62	....	952 48	4,145 49
53	Oakville	482 93	104 70	1,286 81	276 00	721 94	2,872 38
54	Omemee	432 72	432 72	....	268 00	620 67	1,754 11
55	Orangeville	786 59	1,050 00	1,400 00	1,278 00	358 72	4,873 31
56	Orillia	847 80	847 80	3,400 00	951 25	133 07	6,179 92
57	Oshawa	717 88	1,238 16	2,365 00	855 50	193 79	5,370 33
58	Paris	636 14	654 96	1,866 20	144 00	314 49	3,615 79

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High Schools.

	Expenditure.						
	Teachers' salaries.	Building, rent and repairs.	Maps, apparatus, prizes and libraries.	Fuel, books and contingencies.	Total expenditure.	Balances.	Charges per year.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
1	2,776 00	57 43	70 35	1,117 14	4,020 92	470 69	Free.
2	3,261 74	....	....	759 88	4,021 62	285 39	Res., $1; non-res. and Co., $10.
3	2,372 45	....	3 52	540 92	2,916 89	719 12	Res., free; non-res., $10.
4	2,157 80	112 36	109 10	402 09	2,781 35	....	$10.
5	3,085 00	4 50	....	1,800 96	4,890 46	286 22	Res. free; non-res., $10; Co., $2.50.
6	2,126 55	20 53	36 95	363 72	2,547 75	297 54	$10.
7	1,350 00	1,057 87	87 00	316 17	2,811 04	733 36	Free.
8	4,283 40	246 30	8 00	435 53	4,973 23	....	$25.
9	4,066 36	5,623 12	102 12	743 09	10,534 69	1,034 49	Res and Co., $10; non-res., $15.
10	3,600 00	72 30	7 00	952 41	4,631 71	....	Form I., $4; Form II., $6; Forms III., IV., $7.50.
11	2,208 00	....	....	2,427 93	4,635 93	9 20	$10; Form I. free to res.
12	4,570 00	225 44	81 75	680 59	5,557 78	271 48	$10.
13	1,599 96	60 37	36 26	343 77	2,040 36	673 75	City pupils 75c. per mo.
14	2,250 01	274 05	20 90	307 58	2,852 54	943 23	$4.50.
15	3,159 54	4 70	49 15	2,485 14	5,698 53	.....	Res, $6; non-res., $10; Co, $7.50.
16	3,165 00	1,161 27	4 00	492 11	4,822 38	406 66	Res., free; non-res., $10; Co., $10.
17	2,295 00	78 10	105 80	849 55	3,328 45	9 15	$4.50.
18	1,525 00	107 65	53 60	365 73	2,051 98	1,523 12	75c. per mo.
19	4,216 58	....	25 00	878 71	5,120 29	2,763 46	Free.
20	2,899 35	152 88	....	910 82	3,463 05	489 19	Res., free; non-res., $10; Co, $10.
21	2,600 00	35 39	66 00	488 22	3,139 61	889 44	$10; $9.50; Form I. free for town.
22	2,637 75	101 89	17 40	1,183 41	3,890 45	144 92	$4.50.
23	1,948 44	24 30	24 60	343 94	2,341 28	948 26	$10.
24	2,200 00	18 95	52 83	344 04	2,615 82	49 74	Res., $5; non-res. and Co., $10.
25	2,345 57	53 77	4 50	215 40	2,619 24	762 91	Free; non-res., $10.
26	2,235 00	435 54	46 97	511 63	3,229 14	11 29	Free; Co., $10.
27	2,225 00	36 09	23 00	221 24	2,505 33	826 87	$1 per mo.
28	2,491 03	99 05	10 36	707 53	3,307 97	....	$2 50.
29	2,550 00	52 63	5 40	638 52	3,246 55	....	Form I., $7; others $10.
30	2,560 00	35 38	....	771 97	3,367 35	13 27	Res., $1 per mo.; non-res., $2.
31	1,633 86	124 64	....	495 93	2,254 43	335 83	$10.
32	1,300 00	12 20	6 11	179 34	1,497 65	33 16	Co, free; other Cos., $12.
33	2,388 16	....	5 63	504 56	2,898 35	519 56	$4.50.
34	3,268 20	70 86	13 60	987 18	4,339 84	13 01	Res. and Co., $10; non-res., $15.
35	2,100 00	200 00	84 75	364 91	2,749 66	235 82	Free to Co. pupils.
36	3,020 83	106 35	32 00	726 93	3,886 11	1,136 78	$6.
37	3,037 62	130 63	90 46	453 12	3,711 83	....	Res., free; Co., $10; outside Co., $15.
38	3,809 76	16 89	19 58	764 91	4,611 14	682 29	H. S district, $8; Co., $10.
39	3,000 00	92 47	76 33	307 92	3,476 72	297 25	Res., free; others $10
40	2,320 00	....	40 93	646 28	3,007 21	91 18	Town and Co., $10; outside Co., $12.
41	2,290 00	482 89	14 53	12 20	2,799 62	210 96	$10.
42	1,970 82	78 89	98 45	505 40	2,653 56	317 71	H. S. District, $7; Co., $10.
43	3,220 00	63 61	31 84	417 24	3,732 69	255 38	$10.
44	3,420 48	162 63	....	593 92	4,177 03	....	Res., $8; Co. and non-res., $10.
45	2,650 00	617 05	7 68	831 98	4,106 71	129 33	Res., $6; non-res., $10.
46	2,518 55	265 34	51 23	1,070 09	3,905 21	112 52	$ 0; Form I. free to res.
47	2,100 00	25 67	9 91	271 00	2,406 58	311 41	Free.
48	1,225 00	150 00	47 43	308 00	1,730 43	277 13	Free; outsiders $7.50.
49	2,209 68	84 74	161 03	1,836 55	4,292 00	227 23	$10.
50	1,250 00	15 54	9 25	178 61	1,453 40	88 84	Free.
51	2,205 19	150 00	53 12	457 30	2,865 61	....	Free.
52	2,127 93	750 00	5 75	486 00	3,369 68	775 81	Non-res., $15; all others, $6.
53	1,800 00	36 58	21 20	227 85	2,085 63	786 75	$5; $8.
54	1,400 00	....	33 30	275 16	1,708 46	45 65	Res., $5; others, $10.
55	3,492 00	525 97	104 42	526 78	4,649 17	224 14	Town, $9; others, $10.
56	4,001 96	139 20	....	718 49	4,859 65	1,820 27	Town, $5; Co. and non-res., $10.
57	4,008 00	522 11	....	840 22	5,370 33	....	$7.50, all forms except I (Div. A.).
58	2,800 00	41 97	39 90	663 05	3,544 92	70 87	Free; Co. and non-res., $1 per mo.

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VIII.—TABLE H.—The

High Schools.—*Con.*	Receipts.					
	Legislative grants.	Municipal grants (county).	Municipal grants (local).	Fees.	Balances and other sources.	Total receipts.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
59 Parkhill	581 40	581 40	865 00	452 00	716 18	3,195 98
60 Pembroke	681 26	757 62	2,359 16	119 80	5,207 07	9,124 91
61 Petrolea	799 01	1,279 88	2,000 00	108 00	2,275 83	6,462 72
62 Picton	800 20	1,972 20	2,600 00	141 06	314 73	5,828 19
63 Port Arthur	1,035 60	....	1,050 00	29 00	2,137 39	4,251 99
64 " Dover	458 43	470 00	630 14	46 00	122 25	1,726 82
65 " Elgin	599 46	770 02	1,100 00	506 50	49 25	3,025 23
66 " Hope	809 13	1,609 77	1,938 32	985 75	128 00	5,470 97
67 " Perry	682 50	1,263 58	1,389 56	459 50	165 00	3,960 14
68 " Rowan	408 71	678 11	352 43	23 00	.....	1,457 25
69 Prescott	600 19	400 00	1,917 00	34 50	75 71	3,027 40
70 Renfrew	655 69	1,472 85	2,926 81	161 45	30 00	5,246 80
71 Richmond Hill	479 46	784 56	250 00	619 75	291 50	2,425 27
72 Simcoe	786 60	1,970 00	1,498 97	7 00	75 00	4,337 57
73 Smith's Falls	672 06	672 06	1,954 40	299 00	.....	3,597 52
74 Smithville	453 97	464 24	715 00	32 00	330 27	1,995 48
75 Stirling	457 07	.....	.....	203 27	1,335 41	1,995 75
76 Streetsville	450 79	912 67	320 00	196 00	217 29	2,096 75
77 Sydenham	549 30	1,600 00	.....	443 50	86 00	2,678 80
78 Thorold	573 01	572 30	1,550 00	53 00	787 52	3,535 83
79 Tilsonburg	649 04	635 04	1,300 00	348 75	27 43	2,960 26
80 Toronto Junction	876 13	835 58	3,565 00	1,697 50	1,056 51	8,030 72
81 Trenton	604 46	.....	2,859 66	153 44	506 73	3,624 28
82 Uxbridge	637 02	842 11	1,240 00	407 00	67 22	3,193 35
83 Vankleekhill	668 98	1,718 98	1,200 00	168 00	3,434 36	7,190 32
84 Vienna	487 92	487 92	465 00	.....	354 45	1,795 29
85 Walkerton	781 95	1,415 06	1,450 00	806 00	583 04	5,036 05
86 Wardsville	433 68	433 68	345 00	226 00	374 07	1,812 43
87 Waterdown	496 31	896 31	450 00	183 00	146 47	2,172 09
88 Waterford	604 61	1,499 18	700 00	57 00	428 50	3,289 29
89 Watford	668 05	1,559 07	800 00	397 00	1,452 85	4,876 97
90 Welland	658 86	1,572 75	1,650 00	76 00	368 01	4,325 62
91 Weston	476 42	700 00	400 00	367 00	18 88	1,962 30
92 Wiarton	582 60	865 16	1,000 00	380 00	144 37	2,972 13
93 Williamstown	516 76	516 76	2,647 69	54 00	9,051 11	12,786 32
1 Total, 1899	58,681 72	85,582 70	122,083 43	36,010 20	68,529 68	370,887 73
2 " 1898	58,279 41	87,660 35	116,870 28	37,897 86	60,259 03	360,966 93
3 Increase	402 31	.....	5,213 15	.....	8,270 65	9,920 80
4 Decrease	.....	2,077 65	.....	1,887 66	.....	.....
5 Percentage	16	23	33	10	18	.....
6 Cost per pupil	$30 25					

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High Schools.

	Expenditure.						
	Teachers' salaries.	Building, rent and repairs.	Maps, apparatus, prizes and libraries.	Fuel, books and contingencies and other expenses.	Total expenditure.	Balances.	Charges per year.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
59	1,889 00	....	... .	575 58	2,464 58	731 40	Form I., $6 ; Form II., $6 ; Form III., $8 ; Co., $10.
60	3,250 00	4 032 79	31 59	618 12	7,927 50	1,197 41	Free.
61	4,000 00	235 48	....	548 84	4,784 27	1,678 45	Free.
62	4,364 99	119 44	442 00	901 76	5,828 19	....	Free to Co. ; outside Co., $1 per mo.
63	2,217 65	1,456 89	....	479 70	4,154 24	97 75	Free.
64	1,317 82	38 75	112 25	258 00	1,726 32	....	Free.
65	2,550 00	29 80	34 00	361 43	2,975 23	50 00	Form I., Res., $3.50 ; Forms II., III., $6.50; Co. and non-res., $10.
66	4,280 00	383 62	1 00	806 35	5,470 97	....	Town, $9; Co., $7.50 ; non-res., $9.
67	3,350 64	217 16	. ...	175 00	3,742 80	217 34	Res. and Co., $7.50 ; non-res., $10.
68	1,230 19	12 70	36 56	177 80	1,457 25	....	Free.
69	2,283 29	98 74	59 45	572 00	3,013 48	18 92	Res., free ; non-res., $2.50.
70	3,608 30	320 92	36 65	971 17	4,937 04	309 76	Free.
71	1,588 39	16 00	63 47	485 25	2,153 11	272 16	$10.
72	3,818 10	44 04	113 63	361 80	4,337 57	....	Town and Co., free ; non-res., $1 per mo.
73	3,100 00	20 75	112 78	363 99	3,597 52	....	Town, free ; Co. and non-res., $10.
74	1,670 00	37 21	22 50	203 61	1,933 32	62 16	Free ; Form IV. $2 per mo.
75	1,600 00	48 52	... .	347 23	1,995 75	....	$10.
76	1,450 00	7 95	....	211 67	1,669 62	427 18	$5.
77	2,300 00	8 12	7 06	337 60	2,652 78	26 02	Res. of Co., $5 ; non-res., $10.
78	2,130 00	97 62	45 33	767 19	3,040 14	495 69	Free.
79	2,165 20	92 07	58 62	589 22	2,905 11	55 15	$6.
80	4,820 00	720 00	178 95	1,119 56	6,838 51	1,197 21	$10 ; $15.
81	2,450 08	14 61	43 34	558 52	3,066 55	557 73	Co., $25 ; outside Co., $15.
82	2,700 00	17 50	48 12	425 53	3,191 15	2 20	Res., $5 ; Co., $7.50.
83	2,600 00	2,329 99	481 54	452 56	5,864 09	1,326 23	$10.
84	1,225 00	5 70	90	181 68	1,418 28	382 01	Free.
85	3,866 50	78 45	17 50	406 17	4,368 62	667 48	$10.
86	1,325 00	29 22	7 50	446 00	1,807 72	4 71	Res., $8 ; non-res., $10 ; Co., $10.
87	1,950 00	....	11 50	210 59	2,172 09	....	$5.
88	2,200 00	110 25	15 50	448 19	2,773 94	515 35	Vill. and Co., free; outside Co., $36.
89	2,650 00	14 25	42 07	994 23	3,700 55	1,176 42	$10.
90	2,930 00	330 28	148 56	622 87	4,081 71	298 91	Res., free ; non-res., $1 per mo.
91	1,396 00	121 84	55 01	251 68	1,824 53	187 77	$10.
92	2,150 00	101 97	56 28	377 03	2,685 28	286 85	Res., $5 ; others, $10.
93	2,470 50	5,650 00	56 94	4,208 89	12,386 33	399 99	Free.
1	239,725 22	31,860 67	4,445 59	58,962 47	334,993 95	35,893 78	{37 free. 56 fee.
2	242,654 93	22,644 17	3,519 52	59,932 06	328,750 68	32,216 25	{42 free. 51 fee.
3	....	9,216 50	926 07	....	6,243 27	3,677 58	5 fee.
4	2,929 71	....	....	969 59	....	....	5 free.
5	72	9	1	18			

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IX.—TABLE I.—The

Collegiate Institutes.	Pupils. Boys.	Girls.	Total.	Average attendance.	Number of pupils in the Reading.	English Grammar and Rhetoric.	English Composition.	Poetical Literature.	Supplementary Reading in English Literature.
1 Aylmer	79	76	155	93	114	114	155	155	151
2 Barrie	137	101	238	141	170	131	231	231	231
3 Brantford	161	163	324	209	238	230	313	313	313
4 Brockville	150	185	335	220	261	261	335	335	335
5 Chatham	154	181	335	196	335	270	335	335	335
6 Clinton	102	93	195	111	110	110	193	193	114
7 Cobourg	65	77	142	92	92	142	142	142	142
8 Collingwood	78	97	175	89	119	129	175	175	175
9 Galt	133	117	250	151	186	191	250	250	250
10 Goderich	127	107	234	150	160	225	232	232	232
11 Guelph	112	139	251	149	163	251	251	251	251
12 Hamilton	323	403	726	430	257	463	719	719	719
13 Ingersoll	86	63	149	90	123	123	135	135	135
14 Kingston	206	268	474	278	350	429	469	469	469
15 Lindsay	148	106	254	142	184	248	254	254	254
16 London	466	476	942	560	754	754	927	832	832
17 Morrisburg	97	92	189	127	133	137	189	189	189
18 Napanee	105	115	220	153	152	152	220	220	220
19 Niagara Falls	118	131	249	140	190	190	249	249	249
20 Ottawa	265	199	464	277	346	346	464	464	464
21 Owen Sound	172	187	359	214	194	204	359	359	317
22 Perth	93	115	208	185	177	177	207	207	207
23 Peterborough	138	142	280	180	238	223	275	275	275
24 Ridgetown	104	122	226	125	178	178	226	226	226
25 Sarnia	129	135	264	149	245	242	264	264	259
26 Seaforth	89	96	185	119	126	126	185	185	126
27 Stratford	155	148	303	168	216	240	302	302	302
28 Strathroy	95	99	194	131	177	130	192	192	192
29 St. Catharines	133	169	302	166	230	230	302	302	302
30 St. Mary's	86	115	201	120	140	142	190	196	196
31 St. Thomas	193	198	391	233	295	295	391	391	391
32 Toronto (Harbord)	259	275	534	303	347	347	533	533	533
33 " (Jameson)	173	174	347	208	283	283	347	347	347
34 " (Jarvis)	228	213	441	235	294	304	441	441	441
35 Whitby	60	99	159	100	69	115	159	159	159
36 Windsor	151	164	315	170	264	264	315	310	310
37 Woodstock	158	147	305	171	170	170	300	304	300
1 Total, 1899	5,528	5,787	11,315	6,715	8,074	8,566	11,226	11,136	10,943
2 " 1898	5,722	5,889	11,611	7,033	8,350	8,606	11,327	11,456	11,263
3 Increase	....	....	....	....	....	....	....	....	....
4 Decrease	194	102	296	318	276	40	101	320	320
5 Percentage	49	51	....	....	71	76	99	98	97
6 Percentage of average attendance to total attendance	59	....	....	....	....	....	....	....	....

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Collegiate Institutes.

different branches of instruction.

	Canadian History.	English History.	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.	Botany.
1	114	114	47	114	114	148	102	6	101	50	70
2	172	182	103	87	180	230	188	10	162	93	101
3	230	248	100	152	230	313	310	14	150	89	154
4	261	282	67	169	261	335	166	24	23	6	172
5	335	355	85	183	230	255	182	17	216	108	181
6	110	83	83	193	110	193	167	10	83	71	115
7	120	142	22	92	120	142	99	6	50	22	25
8	133	101	54	64	121	175	111	6	81	86	95
9	186	199	64	184	186	250	250	16	63	52	153
10	145	184	96	230	170	282	150	20	145	77	140
11	163	192	59	163	222	246	152	29	111	61	106
12	411	527	305	313	463	700	501	102	247	185	247
13	123	118	34	75	123	138	63	10	57	30	112
14	197	166	97	192	391	408	177	6	117	80	70
15	184	254	100	184	248	193	163	16	127	90	90
16	754	794	175	441	754	836	367	58	453	170	266
17	133	154	91	78	133	189	161	22	118	62	88
18	157	172	68	83	157	218	218	18	23	58	91
19	190	209	59	190	190	249	205	19	97	40	102
20	137	233	103	266	346	464	327	40	144	82	119
21	194	246	165	104	204	325	255	38	203	153	204
22	177	184	55	129	177	208	107	16	101	51	111
23	234	234	63	152	223	275	170	18	96	53	166
24	178	206	78	100	186	223	166	16	154	74	92
25	245	250	66	178	242	264	126	7	109	31	129
26	86	40	50	86	126	184	184	8	92	56	109
27	96	237	67	216	240	233	166	16	150	68	220
28	130	145	88	60	130	180	150	18	90	75	78
29	230	256	72	168	230	302	155	16	42	40	144
30	140	166	76	68	144	198	166	30	137	39	72
31	295	323	96	236	295	391	304	24	117	74	130
32	364	399	184	206	380	584	469	64	241	129	194
33	104	347	84	169	280	345	229	22	182	64	165
34	441	441	147	441	304	441	441	52	249	104	139
35	115	126	44	74	115	159	126	8	41	25	74
36	259	274	51	214	284	310	220	16	139	46	222
37	170	204	135	119	169	305	247	27	178	130	177
1	7,713	8,767	3,332	6,118	8,478	10,7[illegible]1	7,740	830	4,889	2,719	4,923
2	8,033	9,434	3,246	5,973	8,669	11,828	8,041	906	4,766	2,517	5,605
3			86	145					123	202	
4	320	667			191	532	301	76			682
5	68	77	29	54	75	95	68	7	48	24	43

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IX.—TABLE I.—The

Collegiate Institutes.	Number of pupils in the different branches: Zoology.	Latin.	Greek.	French.	German.	Writing.	Book-keeping and Commercial Transactions.	Stenography.	Drawing.	Vocal Music.
Aylmer	6	145	1	74	50	93	93	32	93	......
Barrie	....	283	12	199	37	69	89	52	87	.....
Brantford	3	232	18	221	107	139	161	83	139	.....
Brockville	4	312	9	323	111	169	169	......	169	......
Chatham	4	303	53	200	40	133	133	25	133	......
Clinton	3	151	12	117	38	26	95	63	93	.....
Cobourg	....	142	5	140	25	43	92	......	92	.....
Collingwood	2	154	8	59	11	83	94	69	83	......
Galt	....	156	9	89	82	154	173	72	140	......
Goderich	3	172	8	107	32	82	108	15	108	......
Guelph	2	204	7	212	124	61	177	77	163	......
Hamilton	15	634	35	449	357	113	226	75	226	.....
Ingersoll	5	99	....	82	23	75	75	33	75	......
Kingston	5	375	20	369	171	197	138	84	104	......
Lindsay	....	240	16	158	60	61	85	28	85	......
London	12	760	58	446	98	458	453	180	249	......
Morrisburg	3	179	23	157	35	76	76	76	76	......
Napanee	3	202	5	182	36	83	83	60	83	......
Niagara Falls	5	181	22	134	60	66	166	122	95	......
Ottawa	6	326	51	338	104	266	266	97	266	......
Owen Sound	32	275	12	221	35	104	128	46	104	......
Perth	3	189	24	136	29	51	84	......	85	......
Peterborough	4	176	8	175	52	152	152	33	152	......
Ridgetown	3	208	8	64	32	96	96	26	96	......
Sarnia	....	192	18	156	84	56	173	.....	173	......
Seaforth	2	170	12	117	26	51	86	......	86	.....
Stratford	3	263	25	73	95	174	171	65	173	......
Strathroy	5	170	9	75	40	60	60	60	60	......
St. Catharines	3	296	15	152	146	138	138	....	138	......
St. Mary's	4	193	21	153	68	73	73	34	58	.....
St. Thomas	4	253	9	220	70	86	236	114	236	......
Toronto (Harbord)	6	422	61	485	195	136	248	127	191	....
" (Jameson)	10	324	35	270	115	174	165	54	173	......
" (Jarvis)	8	384	22	339	144	70	168	51	184	.....
Whitby	2	143	3	68	37	89	89	69	89	.....
Windsor	3	231	7	175	45	80	220	28	220	......
Woodstock	8	239	35	154	62	133	107	29	108	......
Total, 1899	181	9,328	696	7,084	2,826	4,165	5,346	1,974	4,832	......
" 1898	229	9,395	835	7,332	3,081	4,284	5,652	1,715	5,528	30
Increase	....	....	....	....	....	....	....	259	....	....
Decrease	48	67	139	248	255	119	306	.....	696	30
Percentage	2	82	6	63	25	37	47	17	43	......
....	....	....	....	....	....	....	....	....	....	....

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Collegiate Institutes.

	of instruction.—*Con.*			Examinations, etc.										
	Drill.	Calisthenics.	Gymnastics.	How many pupils obtained Commercial Diplomas in 1899.	No. passed Junior Leaving Examination.	No. passed Senior Leaving Examination.	No. passed Departmental Matriculation Examination.	No. passed the Junior Matriculation Examination at any University.	No. passed the Senior Matriculation Examination at any University.	No. 1st Class Matriculation Honors.	No. 2nd Class Matriculation Honors.	No. passed Matriculation Examination, Law Society, 1898.	No. passed Matriculation Examination, Medical Council, 1899.	No. passed the Preliminary Examination for a Student in Survey.
1	72	70	70	....	11	....	3	7	....	1	2	....	2	1
2	130	104	....	....	17	3	2	....	....	....	....	....	3	....
3	155	151	155	1	22	2	18	1	....	2	11	1	1	1
4	....	....	....	....	20	3	17	1	3	6	4	....	....	....
5	328	328	328	3	16	6	12	....	....	8	17	....	....	....
6	98	84	98	....	11	1	4	....	....	....	6	....	....	....
7	65	77	65	....	....	2	....	....	....	....	....	....	....	....
8	76	94	....	1	6	3 Pt. I.	5	....	....	3	....	....	....	....
9	127	110	127	9	9	2	6	....	....	....	....	....	....	....
10	127	107	127	....	19	3 in full 4 in part	1	....	....	....	....	....	....	....
11	241	241	112	....	20	5 Pt. I. 5 Pt. II.	16	1	....	....	....	....	....	....
12	575	575	575	....	25	23	28	2	....	22	34	30	17	....
13	81	58	82	....	9	2	3	....	....	....	....	....	....	....
14	....	....	....	....	5	....	25	6	3	....	....	....	....	....
15	142	100	142	....	23	1	3	3	....	2	....	....	....	....
16	738	738	738	12	44	20 Pt. I. 4 Pt. II.	7	....	1	5	4	....	....	....
17	189	189	180	....	12	7	8	2	2	14	3	1	4	....
18	200	200	115	....	14	2	4	4	....	11	2	....	1	....
19	235	235	235	6 Pt. II.	1	....	3	1	....	3	3	....	....	....
20	231	178	231	....	20	3 in full 4 in part	10	18	1	5	4	....	....	....
21	317	317	....	....	38	5	14	2	2	5	5	1	....	....
22	199	199	199	....	....	....	1	....	1	2	....	....	....	....
23	140	137	140	....	12	4	4	....	....	....	....	....	....	....
24	214	214	100	3	9	4	5	5	....	2	6	5	5	2
25	115	120	115	....	1	....	....	2	....	9	....	....	....	....
26	88	96	88	....	11	3	11	....	1	....	....	....	....	....
27	153	187	....	....	16	3	4	2	....	8	5	....	....	....
28	85	90	85	....	18	4	8	2	....	4	7	....	....	....
29	273	273	132	....	10	2	....	18	....	14	8	....	2	2
30	177	104	73	....	15	8	3	2	1	21	36	....	2	....
31	193	198	193	....	15	7	4	....	....	....	1	....	....	....
32	234	252	234	2	36	11	32	2	....	30	18	....	....	....
33	152	158	[illegible]	....	23	2	25	....	....	13	14	....	....	....
34	226	201	427	....	27	2 in full 1 Pt. I. 2 Pt. II.	48 Pt. I. 28 Pt. II.	....	....	15	9	3	7	4
35	148	148	148	....	4	....	1	....	3	6	10	....	....	....
36	146	160	146	....	7	1	7	....	....	....	....	....	....	....
37	300	300	158	....	30	5	10	10	2	8	1	....	....	....
1	6,970	6,788	5,770	31 6 Pt. II.	571	124 29 Pt. I. 11 Pt. II. 8 in part.	304 48 Pt. I. 28 Pt. II.	86	20	219	210	41	44	10
2	6,863	6,610	5,785	39	450	165	340	139	9	123	175	8	48	7
3	107	178	....	....	121	....	....	....	11	96	35	33	1	3
4	....	....	15	....	....	....	....	58		....	....	....	....	....
5	62	60	51	.34	5	1	3	1	....	2	2	.36	.39	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....

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IX.—Table I.—The

High Schools.	Pupils.				Number of pupils in the				
	Boys.	Girls.	Total.	Average Attendance.	Reading.	English Grammar and Rhetoric.	English Composition.	Poetical Literature.	Supplementary Reading in English Literature.
1 Alexandria	48	60	108	57	108	108	108	108	108
2 Almonte	67	63	130	75	113	113	130	130	130
3 Arnprior	44	70	114	65	114	100	114	114	114
4 Arthur	53	55	108	66	67	83	108	108	75
5 Athens	66	89	155	102	120	120	155	155	155
6 Aurora	61	31	92	56	92	59	92	92	92
*7 Beamsville	42	31	73	39	62	62	73	73	....
8 Belleville	152	128	280	143	280	236	280	280	280
9 Berlin	99	71	170	87	155	168	170	169	169
10 Bowmanville	62	67	129	76	86	86	147	147	147
11 Bradford	48	50	98	55	88	88	98	96	82
12 Brampton	119	84	203	130	129	129	203	203	203
13 Brighton	35	42	77	43	54	54	77	77	77
14 Caledonia	67	54	121	78	93	84	119	119	....
15 Campbellford	70	50	120	70	60	60	120	120	120
16 Carleton Place	68	106	174	106	138	138	174	174	174
17 Cayuga	55	48	103	60	65	65	101	101	101
18 Colborne	40	32	72	43	47	47	72	72	47
19 Cornwall	97	103	200	118	200	180	200	200	50
20 Deseronto	39	67	106	75	88	88	106	106	88
21 Dundas	73	64	137	82	137	100	137	137	137
22 Dunnville	61	66	127	71	103	108	127	127	125
23 Dutton	45	56	101	71	59	59	101	101	101
24 Elora	57	40	97	56	72	66	72	72	96
25 Essex	50	50	100	62	61	61	100	100	100
26 Fergus	50	67	117	59	117	117	117	117	117
27 Forest	39	44	83	49	49	52	83	83	83
28 Gananoque	45	77	122	72	105	105	121	121	121
29 Georgetown	53	49	102	60	61	61	99	99	94
30 Glencoe	55	43	98	62	97	70	97	97	97
31 Gravenhurst	31	34	65	33	49	50	65	65	65
32 Grimsby	23	38	61	32	51	51	60	61	61
33 Hagersville	41	39	80	51	62	62	80	80	80
34 Harriston	86	66	152	79	87	95	152	152	123
35 Hawkesbury	41	35	76	43	64	64	76	76	76
36 Iroquois	66	56	122	76	85	85	110	119	119
37 Kemptville	100	82	182	110	110	135	182	182	176
38 Kincardine	64	62	126	76	91	91	126	126	126
39 Leamington	70	64	134	81	93	93	134	134	134
40 Listowel	68	55	123	70	75	102	123	123	123
41 Lucan	66	45	111	70	67	67	111	111	111
42 Madoc	38	44	82	51	51	55	82	82	82
43 Markham	116	82	198	127	103	108	198	198	198
44 Meaford	55	64	119	76	78	81	119	119	119
45 Mitchell	57	47	104	71	81	81	103	103	98
46 Mount Forest	92	69	161	101	100	141	161	161	161
47 Newburgh	72	74	146	79	146	112	146	146	146
48 Newcastle	30	14	44	28	34	34	44	44	44
49 Newmarket	50	50	100	48	61	61	100	100	100
50 Niagara	19	27	46	25	46	42	46	46	46
51 Niagara Falls South	49	47	96	48	88	88	96	96	96
52 Norwood	60	62	122	61	120	100	118	120	120

*Registers lost, building burnt; statistics for preceding year.

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High Schools.

Different branches of instruction.

	Canadian History.	English History.	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.
[illegible]	88	88	29	70	88	103	66	....	66
[illegible]	113	119	31	113	113	130	66	4	85
[illegible]	100	100	27	114	100	114	114	3	58
[illegible]	51	75	33	51	88	108	75	10	75
[illegible]	120	120	78	56	116	154	153	4	94
[illegible]	65	65	33	59	59	92	59	6	59
[illegible]	62	62	14	42	62	78	73	....	34
[illegible]	236	242	44	236	236	280	113	6	70
[illegible]	154	157	42	169	168	170	120	4	67
10	88	42	31	44	86	149	85	10	56
11	88	88	28	70	88	96	80	....	74
12	120	150	53	89	129	203	148	21	71
13	54	54	23	36	54	77	41	....	30
14	84	61	34	84	98	118	118	1	53
15	60	120	50	32	60	118	88	14	50
16	138	140	36	107	138	176	67	2	16
17	65	68	36	39	66	103	103	3	63
18	47	47	25	24	47	72	48	....	15
19	180	180	48	200	180	178	180	8	55
20	88	74	88	47	88	106	106	6	40
21	100	100	87	100	100	136	101	2	78
22	109	109	26	79	112	112	62	2	48
23	59	59	36	96	59	101	101	5	101
24	66	66	36	42	72	95	71	9	60
25	[illegible]	74	26	30	61	99	74	12	59
26	[illegible]	67	50	67	67	117	85	....	70
27	[illegible]	49	34	47	52	83	83	....	34
28	[illegible]	121	31	67	105	121	68	....	48
[illegible]	[illegible]	69	38	21	69	99	99	8	75
[illegible]	[illegible]	77	46	97	70	96	64	11	54
[illegible]	[illegible]	52	16	21	49	65	23	3	11
[illegible]	[illegible]	28	8	28	28	60	33	1	24
[illegible]	[illegible]	62	34	45	62	80	60	1	48
[illegible]	[illegible]	120	90	67	....	152	135	17	125
[illegible]	[illegible]	68	30	37	64	76	50	4	41
[illegible]	[illegible]	100	32	65	86	120	80	4	60
37	110	160	61	59	135	182	158	15	140
38	91	91	52	57	91	126	85	10	43
39	93	131	41	59	93	134	75	8	34
40	102	102	48	75	102	123	123	2	52
41	67	71	44	67	67	111	79	3	54
42	51	51	32	30	51	82	52	....	31
43	108	125	105	51	108	198	147	22	138
44	78	97	58	119	81	113	91	18	53
45	67	67	34	103	81	103	103	5	51
46	100	105	61	73	141	161	161	5	98
47	112	112	34	79	112	146	67	....	45
48	84	84	10	34	34	44	44	....	12
49	61	61	39	61	61	61	63	....	41
50	42	46	4	22	42	46	26	2	12
51	88	88	16	70	88	96	70	....	50
52	120	120	30	30	100	120	75	....	75

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IX.—Table I.—The

High Schools.	Greek.	French.	German.	Writing.	Book-keeping and Commercial Transactions.	Stenography.	Drawing.	Vocal Music.	Drill.
	Number of pupils in the different branches of instruction.—*Con.*								
1 Alexandria	16	108	16	70	70	....	70	....	....
2 Almonte	12	68	28	99	99	47	64	....	....
3 Arnprior	11	77	12	87	80	....	80	....	....
4 Arthur	1	31	5	51	51	33	51	....	108
5 Athens	12	78	20	56	56	....	90	....	....
6 Aurora	1	70	16	33	56	....	59	....	....
*7 Beamsville	1	59	7	42	42	....	42	....	....
8 Belleville	1	187	14	167	167	....	167	....	128
9 Berlin	3	47	150	60	112	24	113	....	85
10 Bowmanville	4	75	15	44	44	....	44	....	....
11 Bradford	....	78	12	12	70	20	70	....	40
12 Brampton	17	165	55	60	89	....	89	....	....
13 Brighton	....	38	11	36	36	....	36	....	....
14 Caledonia	2	21	4	55	55	....	55	....	....
15 Campbellford	....	45	40	52	52	....	52	....	....
16 Carleton Place	30	96	40	54	42	....	107	....	....
17 Cayuga	5	61	4	39	39	....	39	....	....
18 Colborne	....	65	65	24	24	....	24	....	....
19 Cornwall	18	170	85	130	130	....	130	....	....
20 Deseronto	....	56	19	47	32	....	47	....	88
21 Dundas	4	80	38	70	70	....	70	....	73
22 Dunnville	....	78	56	80	79	11	72	....	56
23 Dutton	....	42	17	38	38	....	33	....	45
24 Elora	....	51	24	44	45	6	39	....	....
25 Essex	3	85	14	26	30	....	30	....	100
26 Fergus	40	65	5	32	32	....	32	....	....
27 Forest	1	16	18	27	41	....	41	....	65
28 Gananoque	....	60	28	53	53	....	53	....	121
29 Georgetown	1	77	9	35	35	....	35	....	37
30 Glencoe	6	58	20	44	44	....	44	....	21
31 Gravenhurst	....	18	7	49	48	31	36	....	....
32 Grimsby	....	34	34	27	28	....	28	61	23
33 Hagersville	1	31	14	45	45	....	45	....	41
34 Harriston	7	88	33	36	36	....	35	....	....
35 Hawkesbury	3	69	24	37	37	....	37	....	72
36 Iroquois	2	70	48	65	65	45	65	....	....
37 Kemptville	8	114	20	59	59	....	59	....	....
38 Kincardine	25	120	56	57	57	....	57	....	59
39 Leamington	2	85	38	59	56	....	59	....	....
40 Listowel	2	91	87	75	75	9	75	....	53
41 Lucan	....	49	8	32	32	....	45	....	46
42 Madoc	....	20	....	30	30	....	30	....	....
43 Markham	5	118	8	61	61	51	118	....	51
44 Meaford	5	64	17	42	42	30	42	....	110
45 Mitchell	....	32	54	67	67	....	67	....	52
46 Mount Forest	3	75	10	73	73	....	73	....	92
47 Newburgh	....	115	42	79	78	....	79	....	....
48 Newcastle	....	36	6	20	20	....	20	....	....
49 Newmarket	2	58	41	37	37	....	46	....	100
50 Niagara	....	20	3	20	20	....	20	....	....
51 Niagara Falls South	2	25	25	60	70	25	60	....	28
52 Norwood	....	50	10	55	55	....	55	....	50

*Registers lost, building burnt; statistics for preceding year, except for "Examinations, etc."

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High Schools.

	Calisthenics.	Gymnastics.	Examinations, etc.										
			How many pupils obtained Commercial Diplomas in 1899.	No. passed Junior Leaving Examination.	No. passed Senior Leaving Examination.	No. passed Departmental Matriculation Examination.	No. passed the Junior Matriculation at any University.	No. passed the Senior Matriculation at any University.	No. 1st Class Matriculation Honors	No. 2nd Class Matriculation Honors.	No. passed Matriculation Examination, Law Society, 1899.	No. passed Matriculation Examination, Medical Council, 1899.	No. passed the Preliminary Examination for a Student in Surveying, 1899.
1	....	....	....	8	....	8	....	....	....	....	....	....	....
2	....	....	....	5	....	8	....	....	2	....	....	....	....
3	....	....	....	8	....	2	1	....	1	....	....	....	....
4	108	....	....	20	7	1	....	....	....	....	....	....	....
5	....	....	....	25	....	10	....	....	....	....	....	....	....
6	....	....	....	6	4	8	....	1	4	....	....	....	....
7	....	....	....	5	....	2	....	....	....	....	....	....	....
8	....	....	....	10	2	2	2	....	....	....	....	....	....
9	64	....	....	8	....	....	....	....	....	....	....	....	....
10	....	....	....	7	6	1	1	....	2	....	....	....	....
11	....	....	....	6	....	6	....	....	....	....	....	....	....
12	....	....	....	13	4	11	....	....	12	8	....	....	....
13	....	....	....	10	....	9	9	....	....	....	....	....	....
14	....	....	....	6	1	2	1	....	....	....	2	....	....
15	....	....	....	6	5	8	2	1	....	....	....	1	1
16	....	....	....	11	....	11	8	....	....	....	....	....	....
17	....	....	....	9	2	1	....	....	....	....	....	....	....
18	....	....	....	2	....	1	....	....	....	....	....	....	....
19	....	....	....	12	....	1	2	....	....	....	....	....	....
20	88	....	....	2	2	....	....	....	....	....	....	....	....
21	64	....	....	6	....	....	1	....	1	....	....	....	....
22	18	....	....	2	2	2	....	....	....	....	....	....	....
23	56	....	....	11	1	2 P I 6 P II	....	....	....	1	....	1	....
24	....	....	....	6	2	1	....	....	....	....	....	....	....
25	100	50	....	8	2	4	....	1	....	....	....	....	....
26	....	....	....	....	....	2	2	....	....	....	....	....	....
27	65	30	....	4	....	7 P I 1 P II	....	....	....	....	....	....	....
28	121	....	....	....	....	1	3	....	....	....	....	....	....
29	24	....	....	8	3	....	1	....	....	....	....	....	....
30	13	....	....	8	4	1	1	....	....	....	....	....	....
31	....	....	....	2	....	3	1	....	....	....	....	....	....
32	....	....	....	2	....	2	....	....	....	....	....	....	....
33	....	....	....	4	....	1	....	....	....	....	....	....	....
34	....	....	....	9	8	8	1	....	3	4	....	1	....
35	....	....	....	6	....	....	....	....	....	....	....	1	....
36	....	....	....	8	....	1	....	2	....	....	....	....	....
37	....	....	....	11	8	8	1	....	....	....	....	7	....
38	59	....	....	10	2	1	....	1	....	....	....	....	....
39	.	....	....	6	8	6	5	....	....	....	....	....	....
40	54	53	....	12	....	1	....	....	....	....	....	....	....
41	....	....	....	10	....	8	....	....	2	2	....	....	....
42	....	....	....	7	....	1	....	....	....	....	....	....	....
43	....	....	....	26	7	4	1	....	....	....	....	2	....
44	110	55	....	16	4	6	6	....	....	....	....	6	....
45	47	57	....	6	1	1	1	....	4	3	....	....	....
46	67	....	....	6	3	2	....	....	....	....	....	....	....
47	....	....	....	6	....	....	....	....	....	....	....	....	....
48	....	....	....	3	....	8	....	....	....	....	....	....	....
49	....	....	....	4	....	3	....	....	....	....	....	....	....
50	....	....	....	3	....	....	....	....	....	....	....	....	....
51	30	....	....	2	....	....	....	....	....	....	....	....	....
52	30	....	....	10	....	2	....	....	....	....	....	....	....

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IX—Table I.—The

High Schools.—*Con.*	Pupils.				Number of pupils in the				
	Boys.	Girls.	Total.	Average Attendance.	Reading.	English Grammar and Rhetoric.	English Composition.	Poetical Literature.	Supplementary Reading in English Literature.
53 Oakville	29	46	75	43	65	65	75	75	75
54 Omemee	29	25	54	37	37	37	54	17	37
55 Orangeville	120	101	221	128	120	169	220	220	200
56 Orillia	87	87	174	104	128	128	174	174	174
57 Oshawa	86	88	174	118	174	117	174	174	174
58 Paris	41	43	84	45	73	73	84	84	84
59 Parkhill	45	47	92	57	58	64	92	92	92
60 Pembroke	88	79	167	100	140	140	167	167	167
61 Petrolea	101	92	193	99	91	155	193	193	193
62 Picton	142	120	262	151	203	203	260	260	260
63 Port Arthur	25	69	94	66	94	74	94	94	......
64 " Dover	41	48	89	55	68	82	82	89	68
65 " Elgin	57	49	106	66	86	86	106	106	106
66 " Hope	77	100	177	108	106	110	177	177	177
67 " Perry	63	67	130	76	125	120	130	130	130
68 " Rowan	28	16	44	22	25	25	44	44	14
69 Prescott	38	70	108	60	74	74	108	108	108
70 Renfrew	94	131	225	138	166	178	225	225	225
71 Richmond Hill	57	48	105	57	101	88	103	103	103
72 Simcoe	69	74	143	82	90	90	143	143	143
73 Smith's Falls	66	88	154	100	128	128	154	154	154
74 Smithville	52	50	102	60	74	74	102	102	102
75 Stirling	38	21	59	35	35	39	59	59	59
76 Streetsville	31	17	48	30	39	43	48	48	48
77 Sydenham	57	67	124	75	77	77	122	122	122
78 Thorold	38	67	105	59	105	105	105	105	105
79 Tilsonburg	41	55	96	48	79	79	96	96	79
80 Toronto Junction	114	142	256	187	169	169	254	254	254
81 Trenton	62	58	120	70	80	80	120	120	120
82 Uxbridge	58	62	120	77	79	79	120	120	120
83 Vankleekhill	79	89	168	97	115	115	168	168	168
84 Vienna	17	12	29	13	24	24	29	29	29
85 Walkerton	98	72	170	99	118	118	170	170	170
86 Wardsville	26	27	53	31	26	29	39	39	39
87 Waterdown	30	32	62	35	48	48	60	60	60
88 Waterford	36	40	76	42	59	70	76	76	76
89 Watford	61	82	143	97	85	85	143	143	110
90 Welland	67	78	145	83	102	102	145	145	145
91 Weston	29	25	54	31	41	45	54	54	......
92 Wiarton	45	49	94	59	67	67	94	94	94
93 Williamstown	32	56	88	44	73	73	88	88	88
1 Total, 1899	5,543	5,602	11,145	6,558	8,404	8,387	11,088	11,058	10,354
2 " 1898	5,798	5,892	11,690	7,033	9,069	9,065	11,659	11,611	10,420
3 Increase	......	......	......	......	......	......	......	......	......
4 Decrease	255	290	545	475	665	678	571	553	66
5 Percentage	50	50	......	......	75	75	100	99	94
6 Percentage of average to total attendance	59	......	......	......	......	......	......	......	......

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High Schools.

different branches of instruction.

Canadian History.	English History.	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.	Botany.	Zoology.
65	65	14	65	65	71	73	....	37	17	70	.....
37	37	17	19	54	54	85	....	19	22	19	.....
161	161	155	64	169	219	175	19	161	146	96	5
128	137	68	128	128	171	129	8	96	76	45	5
117	141	48	95	131	174	88	10	48	31	95	.....
73	73	11	48	73	84	41	....	34	11	48	.....
58	58	34	58	64	92	68	5	63	32	67	.....
125	126	42	107	125	167	88	1	56	40	88	.....
165	101	37	91	156	193	101	5	69	26	94	.....
203	219	57	160	205	260	221	16	71	44	161	.....
74	74	20	74	74	94	65	1	45	20	74	.....
68	68	21	50	69	89	53	....	49	19	64	....
86	86	30	106	86	106	67	....	47	28	60	.....
106	152	82	67	106	175	140	21	127	61	72	2
84	84	46	84	120	125	110	10	36	42	58	....
35	25	19	14	25	44	30	....	11	19	30	.....
74	83	34	39	75	108	71	9	85	29	54	.....
178	175	59	107	178	225	118	11	101	27	76	.....
88	88	18	50	88	103	103	....	59	7	51	.....
90	113	40	40	98	133	95	13	91	40	55	.....
128	135	55	89	128	154	154	7	112	55	92	.....
74	80	28	74	74	102	63	6	57	22	51	.....
45	45	18	25	59	59	59	4	32	16	44	2
43	43	18	26	43	48	36	....	35	17	26	.....
77	77	45	55	77	123	92	2	78	42	69	....
87	87	29	71	87	105	105	6	89	18	72	.....
79	79	17	43	79	96	53	....	45	17	50	.....
169	184	98	93	169	249	136	17	124	85	129	8
80	98	39	74	114	120	81	....	76	39	71	.....
79	84	40	53	79	120	95	6	84	33	53	.....
73	129	63	75	115	168	132	13	62	40	81	.....
94	24	10	29	....	28	18	....	18	12	11	.....
116	160	78	73	124	170	107	22	90	52	84	.....
26	26	13	16	29	39	26	....	15	13	15	.....
48	48	12	24	48	60	60	....	31	13	30	.....
70	70	16	50	59	76	50	....	50	17	44	.....
85	143	58	143	85	143	110	13	88	45	51	...
35	102	43	67	102	145	52	11	70	34	71	.....
41	41	14	41	50	54	42	....	44	18	45	.....
67	67	37	46	67	94	64	3	29	26	40	.....
78	78	15	45	73	88	55	....	21	15	83	.....
[illegible]	8,595	3,560	6,253	8,242	11,008	7,961	510	5,346	3,215	5,453	64
[illegible]	9,262	3,168	5,883	9,082	11,512	8,398	503	5,530	2,874	5,770	58
[illegible]	....	392	370	....	....	....	7	....	341	....	11
[illegible]	667	....	....	840	504	437	....	184	....	317	.....
[illegible]	77	33	56	74	99	71	5	48	29	49	.57
....	....	....	....	....	....	....	....	....	....	....	....

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IX.—Table I.—

High Schools.	Greek.	French.	German.	Writing.	Book-keeping and Commercial Transactions.	Stenography.	Drawing.	Vocal Music.
	Number of pupils in the different branches of instruction.—Con.							
53 Oakville	2	3	....	65	65	....	65	....
54 Omemee	2	54	52	19	19	....	19	....
55 Orangeville	11	51	25	64	62	....	64	....
56 Orillia	4	143	52	106	106	....	106	....
57 Oshawa	19	65	58	90	91	....	91	....
58 Paris	....	36	12	43	43	....	43	....
59 Parkhill	5	50	8	24	58	....	58	....
60 Pembroke	4	112	48	79	105	....	105	....
61 Petrolea	34	100	20	91	91	91	91	....
62 Picton	1	220	92	67	163	26	169	....
63 Port Arthur	1	40	40	74	74	....	74	....
64 " Dover	4	21	13	36	43	....	43	....
65 " Elgin	2	106	65	60	60	....	60	....
66 " Hope	7	124	101	67	67	51	65	....
67 " Perry	12	62	54	60	60	20	60	75
68 " Rowan	....	24	8	14	14	....	14	....
69 Prescott	....	75	27	37	53	....	53	....
70 Renfrew	29	178	12	107	107	76	107	....
71 Richmond Hill	11	103	14	50	50	....	50	....
72 Simcoe	10	61	21	42	40	....	40	....
73 Smith's Falls	5	147	52	89	89	....	89	....
74 Smithville	....	28	....	39	39	....	39	....
75 Stirling	2	11	....	36	36	....	36	....
76 Streetsville	1	36	3	26	26	....	26	....
77 Sydenham	....	85	55	55	55	....	55	....
78 Thorold	3	48	13	69	69	75	69	....
79 Tilsonburg	....	58	6	43	43	....	43	....
80 Toronto Junction	15	118	49	93	91	....	92	....
81 Trenton	....	68	40	75	75	28	75	....
82 Uxbridge	3	96	46	25	53	....	53	....
83 Vankleekhill	4	124	62	75	75	....	75	....
84 Vienna	2	18	3	11	11	....	11	....
85 Walkerton	13	78	65	35	73	....	78	....
86 Wardsville	....	27	14	15	15	....	15	....
87 Waterdown	1	27	6	24	24	....	24	....
88 Waterford	....	50	11	50	50	....	50	....
89 Watford	....	35	13	33	33	....	33	....
90 Welland	15	130	40	17	83	....	83	....
91 Weston	....	9	2	41	41	21	41	....
92 Wiarton	2	27	12	46	46	....	46	....
93 Williamstown	....	53	52	33	35	....	33	....
1 Total, 1899	480	6,390	2,687	4,866	5,277	720	5,408	136
2 " 1898	621	6,534	3,207	5,067	5,374	418	5,419	....
3 Increase	....	....	....	....	....	302	....	136
4 Decrease	141	154	520	201	97	....	11	....
5 Percentage	4	57	24	44	47	7	48	1

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Schools.

		Examinations, etc.										
	Gymnastics.	How many pupils obtained Commercial Diplomas in 1899.	No. passed Junior Leaving Examination.	No. passed Senior Leaving Examination.	No. passed Departmental Matriculation Examination.	No. passed the Junior Matriculation at any University.	No. passed the Senior Matriculation at any University.	No. 1st Class Matriculation Honors.	No. 2nd Class Matriculation Honors.	No. passed Matriculation Examination, Law Society, 1899.	No. passed Matriculation Examination, Medical Council, 1899.	No. passed the Preliminary Examination for a Student in Surveying, 1899.
			5									
		7	2		6							
			28	4	14	3					5	
			12	1	1							
			8	1	6							
					1							
			2	2 Pt I	2							
79	88		9	1	9	12		1				
			7	1	19 Pt I							
			13	1	3		2	4	2			
			1		1							
5			4		2							
9			8		8							
			9		7			2	9			
0	160		15	4				13	14		3	
			6									
			8	3	5							
			11	2		18	2				2	
8			10									
0			11	1	1	1			2	1		
			20									
			12		5			2			1	
				1	2							
			2									
			8		9			1				
5	105		4		5							
			1		1							
			21	4	17	1						
			9		12							
9			4	4 Pt I								
			10	2	1	1						
2	17		1		5 Pt I							
			20	5	3 Pt I 1							
			8		3							
			3	1								
					1	1						
			19									
			5	3	6		5		2		2	
4			2								1	1
			7		9							
			1		1	1						
4	615	7	717	108	283	78	15	54	47	3	33	2
0	793	59	553	45	265	73	11	24	43	3	19	4
			164	63	18	5	4	30	4		14	
5	178	52										2
15	6		6	1	3	.7						

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X.—Table K.—The

Collegiate Institutes.	Miscellaneous													
	Brick, stone or frame school house.	Size of playground.	Schools under united board.	Value of library.	Value of scientific apparatus.	Value of charts, maps and globes.	Gymnasium.	Value of gymnasium and appliances.	Museum.	Estimated value of museum.	Schools using authorized Scripture Readings.	Schools opened and closed with prayer.	Schools using Bible.	Religious instruction imparted.
		acres.		$	$	$		$		$				
1 Aylmer	B	4¼	......	608	685	125	1	765	1	300	....	1	....	....
2 Barrie	B	3	......	612	645	118	1	1,820	..	......	....	1	....	....
3 Brantford	B	½	......	608	681	108	1	1,128	..	......	....	1	1	....
4 Brockville	S	3	......	590	1,000	179	1	299	.	......	1	1	1	....
5 Chatham	B	2	......	682	1,240	167	1	734	1	50	1	1	1	....
6 Clinton	B	3⅕	......	626	779	150	1	831	..	......	1	1	1	....
7 Cobourg	B	1	......	605	600	110	1	888	..	......	1	1	....	....
8 Collingwood	B	⅓	......	637	641	82	1	1,229	.	....	1	1	....	....
9 Galt	S	8½	......	1,049	923	39	1	1,304	1	20	1	1	....	....
10 Goderich	B	¼	......	616	658	72	1	2,700	..	......	1	1	....	....
11 Guelph	S	4	1	884	796	145	1	3,057	1	50	....	1	...	....
12 Hamilton	B & S	3	1	971	1,480	133	1	894	1	50	1	1	1	....
13 Ingersoll	B	2	1	538	623	122	1	952	.	......	1	1	....	....
14 Kingston	B	2	1	590	597	62	....	.....	1	100	1	1	1	....
15 Lindsay	B	2	1	1,015	935	133	1	726	1	25	....	1	....	....
16 London	B	3	1	1,012	2,638	169	1	298	1	700	....	1	....	....
17 Morrisburg	B	1	1	619	1,186	131	1	1,168	1	125	1	1	....	....
18 Napanee	B	3½	1	801	825	112	1	1,036	1	25	1	1	1	....
19 Niagara Falls	B	5¾	......	634	618	87	1	1,119	..	.....	....	1	1	....
20 Ottawa	S	1½	......	961	1,342	260	1	2,224	1	100	1	1	....	....
21 Owen Sound	B	3	1	1,249	1,624	114	1	91	1	50	....	1	....	....
22 Perth	B	4	1	680	738	155	1	827	1	500	1	1	....	....
23 Peterborough	B	2½	1	599	866	149	1	760	..	.....	....	1	....	....
24 Ridgetown	B	1¾	......	605	1,004	135	1	996	1	25	....	1	....	....
25 Sarnia	B	2	1	777	616	102	1	1,548	..	...	1	1	....	....
26 Seaforth	B	2¾	......	725	575	155	1	699	1	50	1	1	1	....
27 Stratford	B	5	......	828	1,096	204	1	117	.	......	1	1	....	....
28 Strathroy	B	1¼	......	700	878	114	1	482	..	......	1	1	....	....
29 St. Catharines	B	¼	......	631	733	127	1	775	1	10	1	1	....	....
30 St. Mary's	B	2	......	572	626	113	1	760	.	......	....	1	....	....
31 St. Thomas	B	2¼	1	815	905	110	1	1,281	..	......	....	1	...	....
32 Toronto (Harb'rd)	B	1½	......	854	2,032	161	1	4,710	..	......	....	1	...	....
33 " (Jameson)	B	1½	.. ..	1,201	2,105	155	1	4.790	..	.....	1	1	1	....
34 " (Jarvis)	B	2	......	1,278	1,678	411	1	8,900	1	20	1	1	1	....
35 Whitby	B	½	1	615	451	94	1	1,067	..	.....	....	1	1	....
36 Windsor	B	2	1	726	949	120	1	3,200	1	200	....	....	....	....
37 Woodstock	B	1	.....	979	1,344	145	1	2,172	1	100	1	1	....	....
	B S	acres.												
1 Total 1899	33 4	88 33/40	15	28,492	37,112	5,068	36	56,347	19	2,500	22	36	12	....
2 " 1898	33 4	86	15	29,696	36,170	5,193	34	55,356	19	2,452	23	36	12	....
3 Increase	......	2 33/40	......	....	942	.....	2	991	..	48	....	....	....	.. .
4 Decrease	......	. ...	......	1,204	....	125	...	......	..	......	1	....	....	....
5 Percentage	89 11	......	41	....	. .....	.....	97	......	51	......	60	97	32	....

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Collegiate Institutes.

information.

	Commencement exercises.	Number of pupils in— Form I.	Form II.	Form III.	Form IV.	No. of pupils from municipalities composing the High School district.	From other municipalities within the county.	From other counties.	Who entered mercantile life.	Who became occupied with agriculture.	Who joined a learned profession.	Who became teachers.	Who left for other occupations.	Occupation of parents. Commercial.	Agricultural.	Mechanical.	Professional.
1	1	53	51	44	7	89	64	2	10	11	9	7	14	34	60	53	8
2	....	54	80	93	11	106	127	5	5	5	8	12	9	43	129	35	31
3	1	85	185	86	18	233	85	6	16	2	8	7	17	95	88	110	31
4	1	169	92	47	27	241	88	6	3	....	2	6	5	91	120	96	28
5	1	188	117	66	19	240	93	2	25	15	5	20	30	110	92	80	53
6	1	81	29	75	10	96	94	5	10	8	9	9	11	49	75	48	23
7	....	92	28	16	6	101	41	....	20	5	3	20	....	25	32	80	5
8	....	64	57	46	8	114	43	18	2	5	....	9	13	75	24	61	15
9	1	74	112	51	13	141	85	24	16	7	4	12	33	36	98	94	22
10	1	82	54	78	20	153	71	10	10	....	6	19	23	66	76	55	37
11	1	61	102	59	29	217	22	12	13	....	11	12	19	117	36	67	31
12	1	213	198	189	126	588	82	56	75	20	10	50	70	356	94	179	97
13	1	86	27	26	10	82	57	10	11	2	3	7	33	46	64	22	17
14	....	283	77	96	18	409	55	10	24	6	4	9	37	146	47	209	72
15	1	61	93	84	16	163	79	12	16	9	7	21	23	86	80	47	41
16	1	393	361	135	53	806	117	19	70	20	25	40	60	406	186	301	49
17	1	48	50	70	21	91	98	....	7	6	3	12	7	68	76	31	14
18	1	83	69	53	15	110	101	9	14	7	6	11	23	57	100	40	23
19	1	91	99	40	19	134	94	21	16	10	2	4	25	109	56	68	16
20	1	266	80	84	84	389	52	23	38	10	14	16	41	135	90	141	98
21	1	104	90	123	42	198	116	45	15	4	5	70	37	30	120	184	25
22	1	100	49	48	16	127	76	5	11	6	1	5	30	46	83	56	23
23	....	117	85	62	16	232	46	2	26	6	10	14	30	98	66	98	18
24	1	48	100	62	16	104	118	4	12	18	6	12	14	70	82	52	22
25	1	187	61	58	8	180	79	5	9	9	4	11	52	54	60	110	40
26	1	87	40	50	8	94	87	4	5	15	4	12	18	45	105	28	7
27	1	119	96	67	21	231	54	18	18	5	7	10	45	107	91	85	20
28	1	38	64	70	22	103	87	4	10	25	5	15	15	45	106	28	15
29	1	138	92	46	26	210	84	8	20	12	12	11	22	49	56	176	21
30	1	32	86	52	31	113	45	43	20	14	5	14	20	50	85	53	13
31	....	236	59	68	28	292	99	....	55	35	9	16	12	153	99	120	19
32	1	135	214	138	47	531	1	2	49	....	....	26	100	367	9	54	104
33	1	141	122	50	34	330	9	8	50	10	15	25	60	195	14	105	33
34	....	112	132	118	29	441	......	....	56	5	23	88	44	257	9	87	88
35	1	69	46	33	11	99	56	4	9	30	4	3	13	27	63	52	17
36	1	176	88	36	15	250	62	3	14	5	2	5	36	109	47	136	23
37	1	119	51	100	35	192	105	8	16	20	5	24	40	92	105	68	40
1	30	4,330	3,436	2,614	885	8,230	2,672	413	796	367	256	614	1081	3,944	2,823	3,309	1,239
2	30	4,899	3,212	2,490	1,010	8,270	2,862	479	825	396	262	674	992	3,814	3,351	3,013	1,483
3	....	...	224	124	.....	......	......	....	....	....	....	....	89	130	......	296	......
4	....	519	......	......	125	40	190	66	29	29	6	60	....	......	528	......	194
5	81	39	30	23	8	73	23	4	....	....	....	....	....	35	25	29	11

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X.—TABLE K.—The

High Schools.	Brick, stone or frame school houses.	Size of playground.	Schools under United Board.	Value of library.	Value of scientific apparatus.	Value of charts, maps and globes.	Gymnasium.	Value of gymnasium and appliances.	Museum.	Estimated value of museum.	Schools using authorized Scripture readings.	Schools opened and closed with prayer.	Schools using Bible.	Religious instruction imparted.
						Miscellaneous								
		acres.		$	$	$		$						
1 Alexandria	B	1⅛		256	263	85						1		
2 Almonte	S	1	1	698	421	75		8				1	1	
3 Arnprior	B	1	1	310	361	88		40				1		
4 Arthur	B	2½		262	515	27		6				1		
5 Athens	S	2		412	397	54		4			1	1		
6 Aurora	B	4		325	488	60						1	1	
7 Beamsville	B	2	1	298	244	66						1		
8 Belleville	B	1½	1	342	364	183						1	1	
9 Berlin	B	4		393	864	43		11	1	50		1	1	
10 Bowmanville	B	2		541	450	52					1	1	1	
11 Bradford	B	3		271	342	20		22				1	1	
12 Brampton	B	5		344	578	56		10				1		
13 Brighton	B	⅔	1	248	304	38					1	1		
14 Caledonia	B	1½	1	417	525	52						1		
15 Campbellford	B	½	1	281	436	30					1	1		
16 Carleton Place	S	1	1	488	341	57						1		
17 Cayuga	B	1		172	342	33						1		
18 Colborne	B	⅔	1	248	251	79					1	1		
19 Cornwall	B	¾		446	502	158					1	1		
20 Deseronto	B	3		270	393	86		510	1	50				
21 Dundas	B	2⅞	1	426	482	95		39				1	1	
22 Dunnville	B	¼		327	413	53						1		
23 Dutton	B	1		198	481	32						1		
24 Elora	S	¼		163	344	71					1	1	1	
25 Essex	B	3¼		257	427	84	1	862			1	1		
26 Fergus	S	¾	1	198	290	65						1		
27 Forest	B	2		301	316	62						1	1	
28 Gananoque	B	1	1	456	361	108					1	1		
29 Georgetown	B	4		173	346	63						1		
30 Glencoe	B	2		282	548	55						1	1	
31 Gravenhurst	B	7½		121	358	46						1		
32 Grimsby	F	1		164	197	21					1	1		
33 Hagersville	B	1½		306	447	32					1	1	1	
34 Harriston	B	3		153	360	60						1		
35 Hawkesbury	B	2	1	364	364	46					1	1		
36 Iroquois	B	1¼		575	1,026	127		27	1	250	1	1		
37 Kemptville	B	2	1	300	380	68		19				1		
38 Kincardine	B	4	1	441	628	90		17			1	1	1	
39 Leamington	S & B	1¾		248	402	87		10			1	1		
40 Listowel	B	2½		331	365	64	1	294				1		
41 Lucan	B	3		193	560	73		404				1		
42 Madoc	B	1		172	478	90						1	1	
43 Markham	B	2		242	734	46		13	1	20	1	1	1	
44 Meaford	B	3½		256	492	49	1	1,419			1	1	1	
45 Mitchell	B	¾		228	313	64	1	793		1	1	1		
46 Mount Forest	B	2½		363	515	38					1	1		
47 Newburgh	S	2	1	411	278	58						1		
48 Newcastle	B	2	1	156	288	46					1	1		
49 Newmarket	B	2		146	381	59	1	419				1	1	
50 Niagara	B	½		183	156	62					1	1		
51 Niagara Falls S.	B	2		239	288	41		30				1		
52 Norwood	B	8	1	327	298	18		2				1	1	
53 Oakville	B	⅔	1	267	241	24					1	1		
54 Omemee	F	1	1	229	283	44		3				1		
55 Orangeville	B	2½		517	505	57						1		
56 *Orillia		2½										1	1	
57 Oshawa	B	3	1	372	286	120			1	50	1	1		

* Building

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High Schools.

information.

	Commencement exercises.	Number of pupils in Form I.	Form II.	Form III.	Form IV.	No. of pupils from municipalities composing the High School district.	From other municipalities within the county.	From other counties.	Who entered mercantile life.	Who became occupied with agriculture.	Who joined a learned profession.	Who became teachers	Who left for other occupations.	Occupation of parents. Commercial.	Agricultural.	Mechanical.	Professional.
1	1	37	37	29	....	93	6	4	1	1	2	6	5	16	70	14	3
2	..	64	35	25	6	90	26	14	9	13	....	4	10	16	47	58	9
3	..	50	37	25	2	87	16	11	4	3	1	4	15	23	40	50	1
4	1	33	32	33	10	48	57	3	8	11	1	5	2	31	63	11	3
5	1	37	40	75	3	70	83	2	2	6	3	18	4	23	102	20	10
6	1	33	26	27	6	51	41	....	9	5	2	4	10	25	40	20	7
7	..	34	25	14	.....	68	5	....	4	4	....	3	5	13	34	20	6
8	1	167	69	38	6	234	46	....	34	15	5	10	4	76	72	73	59
9	1	84	44	39	3	95	75	....	20	2	5	10	10	81	24	37	28
10	1	44	42	31	12	79	49	1	4	5	7	8	8	33	39	31	26
11	1	18	52	28	......	67	31	....	6	10	...	6	15	21	42	20	15
12	1	89	40	53	21	92	99	12	12	25	7	13	5	45	110	40	8
13	1	36	18	23	......	57	20	....	6	5	2	6	7	21	27	24	5
14	1	23	61	36	1	93	...	28	8	10	3	4	15	26	53	21	21
15	1	32	38	36	14	77	39	4	7	4	....	5	10	33	32	37	18
16	..	107	31	34	2	141	25	8	6	5	5	9	19	32	40	90	12
17	1	39	26	33	5	27	75	1	2	5	...	11	11	12	66	18	12
18	..	24	23	25	......	45	27	..	2	4	2	3	4	8	56	4	4
19	..	80	49	50	21	125	67	8	10	10	5	12	20	36	64	64	36
20	..	35	33	32	6	77	18	11	10	2	....	5	13	33	33	35	5
21	1	54	47	36	....	90	47	....	20	15	7	4	3	42	29	52	14
22	..	50	44	28	5	73	51	3	7	8	....	5	18	31	44	39	13
23	..	18	41	37	5	46	53	2	2	2	1	7	1	19	52	25	5
24	..	26	35	27	9	42	51	4	4	6	1	3	10	14	45	20	18
25	1	26	35	26	13	43	54	3	8	2	2	10	4	18	43	28	11
26	..	32	35	50	......	88	23	6	10	4	5	24	....	32	57	20	8
27	.	21	28	34	.. ..	37	45	1	2	3	1	3	10	26	38	15	4
28	1	53	87	32	......	91	20	11	10	5	8	3	13	47	28	36	11
29	..	29	41	30	11	38	42	22	3	4	2	9	8	28	44	20	10
30	1	33	19	35	11	46	46	6	4	6	1	6	15	20	49	19	10
31	..	14	35	13	3	50	15	...	10	....	2	1	11	20	11	26	8
32	1	27	24	10	......	27	30	4	8	4	....	....	11	5	37	14	5
33	1	20	25	34	1	43	37	....	5	13	3	4	4	17	37	19	7
34	..	25	42	68	17	60	51	41	9	12	4	20	12	35	57	32	28
35	1	26	29	17	4	26	46	4	6	3	2	1	10	33	28	10	5
36	1	42	43	29	8	36	73	13	5	2	4	5	10	25	63	22	12
37	..	39	71	57	15	62	51	69	6	4	3	35	....	41	61	50	30
38	1	41	38	42	10	59	66	1	6	6	4	10	4	34	67	12	13
39	1	59	34	33	8	57	66	11	8	7	1	5	8	32	56	39	7
40	1	29	46	48	.....	64	40	19	8	....	1	10	12	20	45	47	11
41	..	32	85	41	3	47	63	1	5	2	1	8	3	28	56	14	13
42	..	80	21	31	......	41	41	....	4	2	1	6	3	10	54	8	10
43	1	51	52	73	22	49	142	7	16	13	7	12	14	34	92	37	35
44	1	22	38	45	19	55	53	11	3	4	2	20	15	11	50	46	12
45	1	35	85	29	5	69	32	3	3	5	3	7	8	13	33	47	11
46	1	54	46	56	5	99	24	88	11	5	5	14	8	45	50	47	19
47	1	79	33	34	.....	46	98	2	5	4	....	6	10	20	90	20	16
48	..	10	24	10	.....	20	24	.	2	1	....	2	9	7	23	10	4
49	1	37	24	39	.....	44	54	2	....	3	1	2	10	21	33	31	15
50	..	20	22	2	2	24	22	....	3	6	....	2	1	10	18	9	9
51	1	42	38	16	.....	92	4	....	5	10	....	...	20	9	36	50	1
52	..	46	45	31	......	67	44	11	6	18	....	5	10	10	80	30	2
53	1	28	33	14	.....	48	24	3	6	5	....	5	9	24	26	11	14
54	..	19	18	17	......	31	20	3	2	....	...	2	....	5	32	10	7
55	1	43	72	86	20	95	80	46	16	4	8	21	20	59	101	30	31
56	..	45	61	59	9	111	47	16	6	4	2	13	11	46	46	47	35
57	1	91	40	33	10	118	50	6	12	5	1	3	19	33	47	83	11

burnt.

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X.—TABLE K.—The

Miscellaneous

High Schools.—*Con.*	Brick, stone or frame school house.	Size of play ground.	Schools under United Board.	Value of Library.	Value of scientific apparatus.	Value of charts, maps and globes.	Gymnasium.	Value of gymnasium and appliances.	Museum.	Estimated value of museum.	Schools using authorized Scripture readings.	Schools opened and closed with prayer.	Schools using Bible.	Religious instruction imparted.
		acres.		$	$	$		$		$				
58 Paris	B	4	1	302	535	104	...	...	...	...	1	1	...	...
59 Parkhill	B	2½	1	293	466	93	1	44	1	50	...	1	...	...
60 Pembroke	B	¾	1	232	474	92	...	...	...	...	...	1	...	...
61 Petrolea	B	2⅛	...	389	359	45	...	...	...	...	1	1	...	...
62 Picton	B	3	...	605	663	118	...	...	...	...	...	1	...	...
63 Port Arthur	B	¾	...	145	290	48	...	...	1	20	...	1	...	...
64 Port Dover	B	1½	1	266	513	19	...	7	1	40	1	1	...	...
65 Port Elgin	B	1¼	...	241	350	43	...	...	...	...	...	1	1	...
66 Port Hope	B	¾	...	418	436	72	...	...	...	...	1	1	...	...
67 Port Perry	B	1¾	...	270	439	44	...	...	1	10	...	1	...	...
68 Port Rowan	B	2	1	90	207	22	...	8	...	...	1	1	...	...
69 Prescott	B	1⅛	1	199	367	109		29	...	...	...	1	...	...
70 Renfrew	B	3⅛	1	153	293	33	...	...	...	...	1	1	...	...
71 Richmond Hill	B	1	1	78	253	31	...	...	...	...	1	1	...	...
72 Simcoe	B	3	1	260	704	134	...	29	...	...	1	1	1	...
73 Smith's Falls	B	¾	1	428	494	68	...	...	...	...	...	1	...	...
74 Smithville	B	1	...	107	249	29	...	...	...	...	1	1	1	...
75 Stirling	B	1	1	160	262	33	...	...	...	...	...	1	1	...
76 Streetsville	B	½	...	177	221	70	...	...	1	25	...	1	1	...
77 Sydenham	S	1	...	262	289	31	...	...	...	...	...	1	...	...
78 Thorold	B	2½	...	257	335	102	...	4	...	...	...	1	1	...
79 Tilsonburg	B	2½	...	156	530	69	...	...	...	...	...	1	1	...
80 Toronto Junction	B	1	...	537	570	95	...	...	...	...	1	1	...	...
81 Trenton	B	3½	1	362	394	81	...	...	...	...	1	1	...	...
82 Uxbridge	B	⅓	1	270	330	53	...	...	...	...	1	1	...	...
83 Vankleekhill	B	2¼	...	463	658	37	1	55	...	...	...	1	...	...
84 Vienna	B	4	1	224	252	105	1	651	...	...	1	1	1	...
85 Walkerton	B	1¼	...	304	458	54	...	...	...	...	1	...	...	...
86 Wardsville	B	1	1	215	169	73	...	...	...	...	...	1	...	...
87 Waterdown	S	2½	1	196	330	37	...	...	...	...	...	1	...	...
88 Waterford	B	3	...	316	436	62	...	...	...	...	1	1	...	...
89 Watford	B	2	...	320	385	109	...	20	...	...	...	1	...	...
90 Welland	B	1	...	164	493	23	...	...	...	...	...	1	1	...
91 Weston	B	1½	...	274	434	75	...	...	...	...	...	1	1	...
92 Wiarton	S	1½	...	310	251	45	...	...	...	...	...	1	1	...
93 Williamstown	B & S	3	...	177	216	10	...	...	...	...	...	1	...	...
	B S F													
1 Total, 1899	80 10 2	187	37	26,727	36,957	5,828	8	5,809	10	316	38	91	29	...
2 " 1898	81 9 3	186	39	26,976	35,826	5,718	7	5,076	16	680	37	91	29	2
3 Increase	1	1	...	...	1,131	110	1	733	...	...	1	...	...	...
4 Decrease	*1 1	...	2	249	...	...	...	...	6	364	...	...	...	2
5 Percentage	87 11 2	...	40	...	...	...	9	...	11	...	41	98	31	...

* Orillia building burnt.

High Schools.

information.

	Commencement exercises.	Number of pupils in— Form I.	Form II.	Form III.	Form IV.	No. of pupils from municipalities comprising the High School district.	From other municipalities within the county.	From other counties.	Who entered mercantile life.	Who became occupied with agriculture.	Who joined a learned profession.	Who became teachers.	Who left for other occupations.	Occupation of parents. Commercial.	Agricultural.	Mechanical.	Professional.
58	1	43	30	11	....	66	15	3	5	2	6	....	14	29	17	28	10
59	1	24	34	29	5	53	36	3	4	2	1	7	2	22	28	21	21
60	..	79	46	41	1	129	34	4	16	2	5	5	11	38	31	78	20
61	..	91	64	32	6	128	64	1	11	2	....	10	18	45	42	94	12
62	1	123	82	41	16	143	115	4	10	15	....	16	....	73	113	55	21
63	1	45	29	20	......	67	27	....	10	5	1	3	12	18	36	32	8
64	1	36	32	21	......	54	26	9	7	1	2	1	10	13	37	32	7
65	1	39	37	30	....	59	47	....	6	5	1	5	10	32	37	24	13
66	1	33	73	50	21	105	72	....	14	6	5	10	7	59	68	36	14
67	1	48	36	36	10	60	60	10	6	7	5	18	2	32	60	24	14
68	..	14	11	19	.....	20	24	....	2	2	....	6	2	8	18	10	8
69	1	37	37	25	9	82	23	3	3	4	....	3	12	38	22	42	6
70	1	107	59	50	9	128	95	2	20	12	3	15	10	50	73	70	32
71	1	38	37	26	4	88	15	2	8	4	1	5	27	20	52	23	10
72	1	40	50	40	13	69	72	2	21	30	5	15	19	47	59	28	9
73	..	52	47	48	7	112	20	22	11	8	4	9	14	21	33	88	12
74	..	39	35	22	6	62	37	3	...	6	4	4	2	9	61	18	14
75	..	25	16	14	4	24	35	....	2	3	....	4	....	8	33	10	8
76	1	13	20	15	.....	12	24	12	2	2	2	....	5	4	26	18	.....
77	..	31	46	45	2	59	60	5	2	11	1	9	6	16	90	13	5
78	1	40	36	18	11	81	21	3	7	6	1	2	4	50	39	12	4
79	1	43	36	17	....	67	13	16	6	4	2	....	12	20	27	37	12
80	1	105	43	81	27	98	53	105	15	7	6	16	39	89	74	66	27
81	1	38	43	39	.....	96	11	13	9	4	5	4	2	41	21	35	23
82	1	53	26	35	6	68	50	2	5	8	3	4	5	24	71	21	4
83	..	75	40	40	13	79	61	28	6	5	1	8	8	25	83	37	23
84	..	11	6	12	....	27	..	2	2	2	....	....	....	2	18	7	2
85	1	53	39	55	23	86	77	7	13	38	6	24	13	50	78	23	19
86	1	15	20	18	.....	25	10	18	3	2	1	5	....	5	29	15	4
87	1	24	24	12	2	52	2	8	2	2	....	4	5	13	32	10	7
88	..	26	33	17	...	29	47	....	7	8	....	2	....	14	49	8	5
89	1	33	52	45	13	48	91	4	5	15	....	10	16	32	71	40	.....
90	1	67	35	32	11	66	78	1	....	....	2	15	....	42	47	42	14
91	..	10	30	14	....	27	21	6	4	7	2	2	6	8	21	16	9
92	1	20	37	34	3	71	15	8	4	2	2	3	9	18	19	50	7
93	1	52	21	15	.....	83	1	4	....	1	1	....	1	6	70	8	4
1	59	4,027	3,476	3,089	555	6,373	3,986	786	653	577	211	683	829	2,549	4,497	2,928	1,171
2	60	4,468	3,889	2,810	523	6,619	4,241	830	666	654	237	762	1,003	2,520	5,363	2,853	954
3	..	......	....	277	32	......	..	....	....	....	....	....	..	29	....	75	217
4	1	441	413	......	......	246	255	44	13	77	26	79	174	......	866	......	......
5	65	36	31	28	5	57	36	7	....	....	....	....	....	23	40	26	11

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Statistics.	No. 5, Bromley.	No. 9, Cambridge.	No. 1, Marlboro'.	No. 6, Plantagenet North.	Puslinch.	Rama.	L'Orignal.	Penetanguishene.	Total.
Number of schools	1	1	1	1	1	1	1	1	8
Receipts :	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Balances from 1898	62 31	3 40	2 50	38 77	44 96	105 34	362 92	54 85	675 05
Government grants	11 80	4 15	5 35	6 55	12 62	49 12	38 85	144 74	273 18
Municipal grants	....	....	....	....	....	....	525 38	1,592 00	2,117 38
Trustees' school taxes	329 70	94 34	45 39	351 48	175 00	175 00	....	....	1,170 91
Other sources	36 15	....	40 00	5 00	99 92	268 00	....	35 00	484 07
Total	439 96	101 89	93 24	401 80	332 50	597 46	927 15	1,826 59	4,720 59
Expenditure :									
Teachers' salaries	200 00	80 25	45 00	250 00	230 00	350 00	410 00	1,351 14	2,916 39
School sites and buildings	128 50	....	21 87	43 58	1 93	....	....	....	195 88
Libraries, maps, etc	....	....	....	....	20	28 15	....	....	28 35
Other expenses	16 55	12 10	50	64 73	23 80	63 43	97 21	469 70	748 02
Total	345 05	92 35	67 37	358 31	255 93	441 58	507 21	1,820 84	3,888 64
Balances on hand	94 91	9 54	25 87	43 49	76 57	155 88	419 94	5 75	831 95
Teachers : Certificate, Salary	Female, III. $200	Female, Temp. $168	Female, III. $180	Female. II. $250	Female, III. $230	Male, II. $350	Female, III. $410	1 Male, II. Cert., $600 3 Female, III. Cert. $300 250 250	11 Teachers, 2 Male, 9 Female; 3 II. Certs., 7 III. and 1 Temporary: Av. salary: Male, $475 Female, $249.
Pupils :									
Total attending	27	16	12	10	27	94	57	198	441
Boys	14	10	6	7	13	55	22	101	228
Girls	13	6	6	3	14	39	35	97	213
Attending less than 20 days	4	1	8	1	5	2	5	12	33
" 20 to 50 days	4	2	4	2	5	12	4	27	60

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" 51 to 100 days	9	7	5	1	7	20	18	28	90
" 101 to 150 days	3	6	....	4	6	17	7	33	76
" 151 to 200 days	7	....	....	2	4	31	28	98	170
" 201 days to year	....	....	....	....	....	12	....	....	12
Average attendance	12	7	4	5	10	44	34	130	246
No. in 1st Reader, Part I	5	5	8	2	4	31	13	54	122
" 1st " " II	3	3	2	1	3	12	12	38	74
" 2nd "	7	3	1	1	8	20	1	33	74
" 3rd "	7	5	1	2	3	17	15	35	85
" 4th "	2	....	....	3	6	12	16	27	66
" 5th "	3	....	....	1	3	2	....	11	20
Writing	27	16	12	10	27	94	57	198	441
Arithmetic	27	16	12	10	27	94	57	198	441
Drawing	27	16	12	10	27	94	57	198	441
Geography	12	11	6	7	27	81	31	198	323
Music	....	16	....	10	27	....	57	54	164
Grammar	12	5	2	8	25	31	44	106	233
History	12	8	1	6	12	81	22	73	160
School houses (brick, frame or log)	F	L	L	F	F	F	B	B	2 B, 4 F, 2 L
No. of maps	6	5	1	7	11	16	18	7	71
No. of globes	....	....	....	....	1	1	1	....	3

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XII. TABLE M.—Report on Truancy.

Cities.	No. of children otherwise employed during school hours.	No. of cases of truancy reported.	No. of complaints made before Police Magistrates or J. P's.	No. of convictions.	No. of children not attending any school.
Guelph	6	40	1	...	6
Hamilton	16	186	28	7	...
Stratford	...	75	4	4	...
St. Thomas	3	105	5	4	...
Toronto	...	*900	...	...	...
Windsor	...	73	...	...	1
Towns.					
Almonte	...	21	...	...	...
Arnprior	...	4	...	...	...
Aurora	...	16	...	...	...
Aylmer	...	80	...	...	...
Barrie	...	37	2	2	...
Brockville	...	...	1	...	...
Cornwall	...	2	...	...	...
Deseronto	...	10	...	...	...
Durham	...	6	...	...	...
Forest	1	9	...	...	...
Galt	...	10	...	...	6
Goderich	...	18	3	1	...
Lindsay	2	75	2	2	...
Listowel	...	23	...	...	...
Milton	...	8	...	...	...
Niagara	...	23	...	...	...
Niagara Falls	3	48	3	3	136
Orangeville	2	7	1	1	...
Orillia	...	32	1	1	2
Oshawa	...	6	...	...	...
Parry Sound	1	18	16	...	2
Pembroke	...	10	1	1	2
Perth	...	12	1	...	...
Petrolea	2	25	...	...	6
Peterboro'	...	25	3	...	...
Port Arthur	...	6	...	...	6
Prescott	...	9	1	...	...
Preston	...	4	...	...	...
Sarnia	...	83	...	...	...
Simcoe	6	200	...	...	1
Stayner	...	...	...	...	14
Strathroy	...	8	...	...	...
St. Mary's	...	6	...	...	...
Thorold	...	9	...	...	3
Toronto Junction	...	10	...	...	...
Trenton	13	27	7	...	20
Vankleekhill	...	18	...	...	18

* Statistics of Annual Report of preceding year.

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XII.—TABLE M.—Report on Truancy.

Towns.—*Con.*	No. of children otherwise employed during school hours.	No. of cases of truancy reported.	No. of complaints made before Police Magistrates or J. P's.	No. of convictions.	No. of children not attending any school.
Walkerton		30			
Waterloo		10			
Wiarton	5	13			
Woodstock		5			
Villages.					
Alvinston		1			
Bayfield		16			
Beamsville	1	5	1	1	
Beaverton		3			
Bolton					1
Bridgeburg		55			
Brighton	10	5			
Burk's Falls		2			2
Burlington		6			2
Campbellford	5	12			
Chesley		4			4
Drayton		13			13
Dundalk	10	52			
Elora		26	4	2	
Exeter		10			1
Fort Erie		2			2
Georgetown		25			
Glencoe	3	4			
Huntsville					4
Kingsville	1	2	1	1	12
Markdale		8			
Merritton					1
Norwich		1	1	1	
Stirling	2	20	6		
Tara	1	1	1	1	
Total	93	2,560	94	32	265

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XIII.—TABLE N.—Report on Kindergartens.

Locality.	No. of Kindergartens.	No. of Teachers.	No. of pupils attending.	Average attendance.
Cities:				
Belleville	1	2	51	20
Brantford	3	7	349	117
Chatham	1	2	174	75
Guelph	1	2	172	70
Hamilton	15	21	1,293	524
Kingston	3	3	162	124
London	14	28	1,168	375
Ottawa	13	19	1,069	418
Stratford	3	5	299	104
Toronto	46	126	4,725	2,019
Towns:				
Aylmer	1	1	61	46
Berlin	3	5	252	184
Dundas	1	1	129	56
Galt	1	2	72	52
Ingersoll	1	2	115	46
Niagara Falls	1	4	126	33
Owen Sound	1	3	121	51
Peterborough	2	5	201	77
Preston	1	1	75	46
Tilsonburg	1	1	89	34
Toronto Junction	2	3	152	58
Waterloo	1	1	130	46
Villages:				
Ashburnham	1	2	96	46
Campbellford	1	1	101	28
Hespeler	1	1	80	52
Total	119	248	11,262	4,701

XIV.—TABLE O.—Report on Night Schools.

Locality.	No. of Night Schools.	Teachers.	Pupils attending.	Average attendance.
Brantford	2	6	88	8
Hamilton	2	6	134	19
St. Catharines	1	1	27	7
Toronto	10	22	709	211
Windsor	1	2	68	17
Total	16	37	1,026	262

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XV.—TABLE P.—General Statistical Abstract.

A General Statistical Abstract, exhibiting the comparative state and progress of Education in Ontario, as connected with Public, Separate and High Schools (including Collegiate Institutes); also Normal College and Normal and Model Schools, from the year 1867 to 1899, compiled from Returns in the Education Department.

No.	Subjects compared.	1867.	1872.	1877.	1882.	1887.	1892.	1897.	1898.	1899
1	Population	....	1,620,851	....	1,926,922	....	2,114,321	....	....	....
2	School population between the ages of five and sixteen years, up to 1884 (and five to twenty-one subsequently)	447,726	495,756	494,804	483,817	611,212	595,238	590,055	591,300	584,199
3	High Schools (including Collegiate Institutes)	102	104	104	104	112	128	130	130	130
4	Normal College and Normal and Model Schools	3	3	4	6	6	6	7	7	7
5	Total Public Schools in operation	4,261	4,490	4,955	5,013	5,277	5,577	5,574	5,587	5,654
6	Total Roman Catholic Separate Schools	161	171	185	190	229	312	340	345	352
7	Grand total of all schools in operation	4,527	4,768	5,248	5,313	5,624	6,023	6,051	6,069	6,143
8	Total pupils attending High Schools (including Coll. Institutes)	5,696	7,968	9,229	12,348	17,459	22,837	24,390	23,301	22,387
9	Total students and pupils attending Normal College, Normal and Model Schools	800	800	900	1,059	1,204	1,270	1,492	1,492	1,379
10	Total pupils attending Public Schools	382,719	433,256	465,908	445,364	462,839	448,204	441,157	436,727	429,227
11	Total pupils attending Roman Catholic Separate Schools	18,924	21,406	24,952	26,148	30,373	37,466	41,620	41,667	41,796
12	Grand total, students and pupils attending High, Public, Separate, Normal College and Normal and Model Schools	408,139	463,430	500,939	484,918	511,875	509,777	508,659	503,187	494,789
13	Total amount paid for the salaries of Public and Separate School Teachers	$1,093,516	1,371,594	2,038,099	2,144,448	2,458,540	2,752,628	2,886,001	2,914,830	2,951,812
14	Total amount paid for the erection and repairs of Public and Separate School houses, and for libraries and apparatus, books, fuel, stationery, etc	$379,672	835,770	1,035,390	882,526	1,283,565	1,301,289	1,329,609	1,477,885	1,420,248
15	Grand total paid for Public and Separate School Teachers' salaries, the erection and repairs of school houses, and for libraries, apparatus, etc.	$1,473,188	2,207,364	3,073,489	3,026,974	3,472,105	4,052,917	4,215,670	4,392,715	4,372,060
16	Total amount paid for High School (including Collegiate Institutes), Teachers' salaries	$91,820	141,812	211,607	253,864	327,452	470,828	532,837	531,887	528,614
17	Total amount paid for erection and repair of High School (including Collegiate Institutes) houses, maps, apparatus, prizes, fuel, books, etc	$19,190	31,369	51,417	89,857	168,160	215,871	183,139	202,957	193,625
18	Amount paid for other educational purposes*	$332,825	439,690	250,968	262,307	280,832	353,987	346,830	342,916	310,184
19	Grand total paid for educational purposes	$1,920,023	2,820,226	3,587,481	3,633,002	4,518,549	5,094,603	5,278,463	5,470,475	5,404,483
20	Total Public and Separate School Teachers	4,890	5,476	6,468	6,857	7,594	8,480	9,128	9,209	9,085
21	Total male teachers	2,849	2,626	3,020	3,062	2,718	2,770	2,784	2,743	2,713
22	Total female teachers	2,041	2,850	3,448	3,795	4,876	5,710	6,344	6,466	6,372

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XVI.—TABLE Q.—County Model Schools, 1899.

	Name of Model School.	Name of Principal.	Certificate of Principal.	Salary of Principal.	Year of appointment.	Time Principal devotes to Model School work during the term.	No. of assistants with 1st class certificates.	No. with 2nd class.	No. with 3rd class.	No. with other class.	What time did assistant relieve a Principal from public work?	Is separate room provided?	Is there a professional library? No. of volumes.	Government grant.	Municipal grant.	Fees.	No. of divisions in school.	No. of divisions used for Model School purposes.	No. of pupils sent at one time to observe or teach.	Length of time students are trained before being sent to the division to observe.	Length of time students are trained before being sent to the divisions to teach.
				$										$	$	$					
1	Athens	Robert Thompson	I	700	1896	all day.	....	3	....	....	all day.	1	1— 54	150	150	110	4	4	6	6 w	6 w
2	Barrie	W. J. Hallett	I	900	1893	"	1	8	....	....	"	1	1— 60	150	150	55	9	8	2	6 w	6 w
3	Beamsville	H. J. Talbot	I	600	1899	"	2	2	....	....	"	1	1— 92	150	150	90	4	4	5	6 w	6 w
4	Berlin	Jeremiah Suddaby	I	1,100	1877	"	1	4	4	....	"	1	1—150	150	150	55	9	9	3	6 w	6 w
5	Bracebridge	G. H. O. Thomas	II	700	1885	"	...	6	2	....	"	1	1—180	300	....	45	8	7	4	5 w	6 w
6	Bradford	A. Orton	I	800	1888	"	....	4	....	....	"	1	1— 67	150	150	40	4	4	2	6 w	7 w
7	Brampton	A. Barber	I	800	1895	"	....	7	....	...	"	1	1—100	150	250	64	9	7	4	3 w	8 w
8	Brantford	W. Wilkinson	M.A.	1,275	1872	5½ hours	2	13	2	....	"	1	1—300	150	150	45	17	15	5	5 w	6 w
9	Caledonia	A. B. Shantz	I	700	1895	all day.	....	8	....	...	"	1	1—191	150	150	70	4	4	4	7 w	7 w
10	Chatham	T. C. Smith	I	900	1893	"	2	8	1	....	"	1	1—300	150	150	120	12	10	3	7 w	7 w
11	Clinton	W. R. Lough	I	825	1884	"	....	6	....	1B.A	"	1	1— 70	150	150	65	8	7	2	6 w	6 w
12	Collingwood	Edward Ward	I	950	1880	"	....	8	6	....	"	1	1— 69	150	150	45	14	14	2	6 w	6 w
13	Cornwall	John Connolly	I	900	1892	"	....	10	...	....	"	1	1—150	150	150	55	10	10	3	5 w	5 w
14	Durham	Thomas Allan	I	700	1888	"	1	3	2	....	"	1	1— 60	150	150	55	6	5	2	6 w	8 w
15	Elora	L. K. Fallis	I	650	1894	"	1	4	....	....	"	1	1— 72	150	150	100	5	5	4	8 w	9 w
16	Forest	James Campbell	I	725	1894	"	....	5	....	....	"	1	1— 70	150	150	67	6	5	3	5 w	6 w
17	Galt	R. Alexander	I	1,000	1875	"	1	6	....	....	"	1	1— 64	150	150	45	8	8	5	8 w	7 w
18	Gananoque	J. C. Linklater	I	1,000	1888	"	1	5	5	....	"	1	1— 69	150	150	10	12	6	2	6 w	7 w
19	Goderich	S. P. Halls	M.A.	900	1894	"	2	10	....	...	"	1	1— 75	150	150	89	12	12	4	6 w	6 w
20	Hamilton	W. H. Davis	I	1,200	1899	3 hr. a w.	15	27	...	....	¾ hr a w.	1	1 - 650	150	150	135	12	42	4	5 w	6 w
21	Ingersoll	H. F. McDiarmid	I	900	1885	all day.	2	6	4	....	all day.	1	1— 64	150	......	30	14	12	3	5 w	6 w
22	Kincardine	F. C. Powell	I	850	1877	5½ hrs.	....	3	4	....	5½ hrs.	1	1— 66	150	150	65	8	7	3	6 w	7 w
23	Kingston	L. E. Staples	I	600	1899	6 hrs.	1	8	....	2	all day.	1	1—200	150	150	115	11	9	4	5 w	6 w
24	Lindsay	G. E. Broderick	I	1,000	1888	all day.	1	18	....	....	"	1	1— 60	150	150	135	19	14	2	5 w	7 w
25	London	R. M. Graham	I	1,200	1891	"	1	9	....	....	"	1	1— 70	150	81	245	12	10	5	4 w	6 w
26	Madoc	T. C. Tice	I	700	1897	"	...	6	...	....	"	1	1— 45	150	250	95	6	6	3	6 w	6 w
27	Meaford	M. N. Clark	I	600	1899	5½ hrs.	....	8	5	...	5½ hrs	1	1— 52	150	150	90	8	8	4	6 w	8 w
28	Milton	W. F. Inman	I	750	1893	all day.	....	4	2	....	all day.	1	1— 62	150	200	70	6	5	3	6 w	6 w

29 Minden	F. C. Gillis	II	450	1897	"	....	1	1	....	"	1	1—54	150	150	75	3	3	8	6 w	6½ w
30 Mitchell	J. W. McRoberts	I	600	1899	"	....	4	3	....	"	1	1—55	150	...	55	7	7	2	6 w	6 w
31 Mount Forest	H. Bewell	I	700	1897	"	....	7	1	....	"	1	1—69	150	150	90	8	8	3	6 w	6 w
32 Morrisburg	A. E. Meldrum	I	700	1896	"	..	5	2	....	"	1	1—71	150	150	90	7	7	4	5 w	5 w
33 Napanee	C. H. Edwards	B. A.	750	1899	"	2	7	...	...	"	1	1—90	150	....	....	10	7	2	7 w	7 w
34 Newmarket	J. W. Forhan	I	600	1899	"	1	4	....	....	"	1	1—84	150	175	60	6	6	3	6 w	6 w
35 Norwood	H. R. Scovell	B. A.	640	1897	"	....	5	....	....	"	1	1—60	150	150	105	5	5	6	4 w	6 w
36 Orangeville	M. N. Armstrong	I	800	1884	"	2	7	1	....	"	1	1—65	150	150	85	10	7	3	7 w	7 w
37 Owen Sound	T. A. Reid	I	1,000	1894	"	....	23	3	....	"	1	1—93	150	150	90	13	12	2	6 w	8 w
38 Parry Sound	A. M. Currie	I	700	1896	"	2	5	....	2	"	1	1—62	300	....	105	9	7	4	6 w	8 w
39 Perth	M. M. Jacques	I	1,000	1884	"	....	7	1	1	"	1	1—80	150	150	.....	10	10	4	6 w	7 w
40 Picton	R. F. Greenlees	I	800	1886	"	...	7	....	....		1	1—60	150	150	55	8	8	3	8 w	8 w
41 *Plantagenet	D. Chenay	I	1,200	1890	½ day	...	1	....	2	......	1	1—60	950	450		4	3	19	3 w	3 w
42 Port Hope	F. Wood	I	1,000	1885	all day	...	14	1	....	all day	1	1—70	150	225	180	15	12	3	6 w	6 w
43 Port Perry	A. M. Rae	I	800	1877	5½ hrs.	1	3	2	....	5½ hrs.	1	1—70	150	150	60	6	6	4	7 w	8 w
44 Prescott	A. A. Jordan	I	900	1899	all day	....	6	....	....	all day	1	1—77	150	150	70	6	6	3	6 w	9 w
45 Renfrew	E. N. Jory	I	825	1891	"	....	5	2	....	"	1	1—70	150	150	80	8	8	3	6 w	6 w
46 Richmond	R. J. Brown	I	600	1898	"	....	2	....	....	"	1	1—60	150	400	20	3	3	4	6 w	6 w
47 St. Thomas	Wm. Rannie, Actg.	I	1,000	....	"	....	11	....	....	"	1	1—85	150	50	160	11	11	3	5 w	7 w
48 Sarnia	A. Wark	I	950	1877	"	1	8	....	....	"	1	1—58	150	150	70	9	9	2	6 w	7 w
49 Simcoe	I. S. Rowat	I	800	1889	"	1	7	....	....	"	1	1—120	150	150	70	8	8	2	6 w	7 w
50 Stratford	J. R. Stuart	I	1,000	1887	"	....	22	3	....	......	1	1—120	150	150	185	25	18	3	6 w	6 w
51 Strathroy	T. Dunsmore	I	850	1882	"	....	8	....	....	all day	1	1—76	150	150	120	9	9	3	6 w	6 w
52 Toronto	W. E. Groves	I	1,200	1895	"	14	74	....	....	"	1	1—205	150	150	205	12	12	14	3 w	6 w
53 Toronto Junction	William Wilson	I	950	1889	"	....	10	....	....	"	1	1—75	150	175	160	12	10	3	6 w	6 w
54 Vankleekhill	S. J. Keys	I	750	1898	"	....	4	....	....	"	1	1—70	150	200	65	4	4	3	6 w	7 w
55 Walkerton	E. J. Rowlands	I	850	1893	"	....	9	....	....	"	1	1—65	150	150	110	9	9	3	6 w	6 w
56 Whitby	J. A. Brown	I	950	1877	"	1	2	1	3	"	1	1—97	150	150	35	7	7	3	6 w	7 w
57 Windsor	G. W. Chisholm	I	900	1895	"	....	7	1	....	"	1	1—30	150	150	110	8	8	3	6 w	6 w
58 Woodstock	S. Nethercott	I	900	1893	"	....	28	...	1	"	1	1—115	150	150	75	30	16	2	6 w	8 w
59 *R. C. S. S. Ottawa	M. J. O'Connor	B. A.	800	1896	all aft.	....	....	...	....	....	....	.....	800	......	30	....	....	....	...	...
60 District Training Schools	....	.....	.....	..	....	....	....	....	....	....	....	....	1,400	....	....	....	....	....	.....	...
Total	....	2 M.A. 3 B.A. 52 I. 2 II.	....	.....	....	59	502	59	12	....	....	58—5,777	12,000	8,756	4,770	....	....	....	....	....

* French Training School.

XVI.—TABLE Q.—County Model Schools, 1899—*Continued.*

	Name of Model School.	During how many weeks do students teach in the divisions?	How many hours per day?	Total number of classes in the divisions used for Model School purposes.	Average number of lessons taught by each student during the term.	Average number of lessons each class will be taught by all the students during the term.	Average length of each lesson.	How long does a student remain in a division before passing to another?	No. of students on roll.	Male.	Female.	No. who passed final examination. Male.	No. who passed final examination. Female.	No. who passed final examination. Total.	No. with Senior Leaving certificate.	No. with Junior Leaving certi.	No. with Primary certificate.	No. with District certificate.	Allowance made by Trustees to Principal's assistant.	No. of renewals granted by the Board.	Average age of students.
			Hours																$		yrs.
1	Athens	7 w	2½	11	20	40	20 m	2 d	22	7	15	7	14	21	....	18	4	....	120	5	19½
2	Barrie	8 w	1½	18	20	11	15 m	1 w	10	5	5	5	5	10	1	9	....	....	...	8	19⅓
3	Beamsville	6 w	1	9	12	24	20 m	6 d	18	10	8	10	8	18	2	14	2	....	125	12	21
4	Berlin	6 w	1½	18	30	18⅓	25 m	5 d	11	4	7	4	7	11	....	9	2	....	125	14	$19\frac{1}{11}$
5	Bracebridge	6 w	2	16	20	12	15 m	1 w	9	1	8	....	8	8	...	2	1	6	150	1	19
6	Bradford	6 w	40 m	10	20	16	20 m	6 d	8	1	7	1	7	8	....	7	1	....	125	.....	19
7	Brampton	6 w	1½	14	35	27	20 m	4 d	11	5	6	3	5	8	3	7	1	....	....	3	19
8	Brantford	7 w	2	22	24	8	25 m	2 d	10	3	7	*	*	...	....	9	1	....	....	4	19
9	Caledonia	6 w	2¾	8	17	29¾	20 m	1 w	14	8	6	8	6	14	1	10	3	....	125	11	19⅓
10	Chatham	4 w	1	20	20	24	20 m	2 d	24	5	19	5	17	22	5	12	7	....	175	38	19
11	Clinton	4 w	20 m	15	22	15	20 m	3 d	13	6	7	6	7	13	....	11	2	....	90	17	19½
12	Collingwood	4 w	1	21	17	8	25 m	1 w	9	3	6	3	6	9	1	5	3	....	130	.....	19⅓
13	Cornwall	6 w	1	20	18	11	20 m	1 w	11	5	6	5	6	11	....	4	7	....	150	30	$19\frac{7}{10}$
14	Durham	3 w	1	12	20	18	25 m	2 d	11	1	10	1	10	11	1	4	6	....	125	13	19
15	Elora	4 w	1¼	14	14	20	20 m	2 d	20	9	11	9	11	20	1	15	4	....	125	16	19
16	Forest	6 w	1½	13	18	19	20 m	1 w	14	5	9	5	9	14	1	11	2	....	125	.....	19
17	Galt	6 w	1½	14	22	14	20 m	1 d	9	3	6	2	5	7	1	6	2	....	150	.....	19⅗
18	Gananoque	6 w	40 m	13	24	4	20 m	1 w	2		2	....	2	2	....	2	....	....	125	2	18
19	Goderich	6 w	1½	22	24	18	20 m	4 d	17	5	12	5	11	16	4	9	4	....	150	16	19
20	Hamilton	6 w	1¼	42	18	14	25 m	1 w	27	11	16	9	16	25	4	21	2	....	300	6	20⅓
21	Ingersoll	5 w	1	12	20	10½	23 m	4 d	7	3	4	3	4	7	1	5	1	....		14	21
22	Kincardine	7 w	1⅓	20	28	18	20 m	3 d	13	4	9	4	9	13	7	2	4	....	125	10	$18\frac{11}{13}$
23	Kingston	7 w	1¼	9	18	16	20 m	1 w	23	5	18	5	18	23	1	17	1	....	99	10	$19\frac{7}{10}$
24	Lindsay	5 w	1¼	32	20	16	20 m	2 d	27	12	15	12	15	27	2	19	6	....	....	7	$18\frac{7}{10}$
25	London	6½ w	1¾	16	20	60	20 m	2 d	49	16	33	15	29	44	7	31	11	....	250	1	$19\frac{3}{10}$
26	Madoc	5 w	1	15	18	23	15 m	3 d	19	7	12	6	12	18	1	12	6	....	140	15	18⅘
27	Meaford	4 w	1½	12	20	30	20 m	2 d	18	5	13	5	12	17	4	13	1	....	70	9	19
28	Milton	6 w	1	17	20	21	20 m	1 w	14	5	9	5	9	14	1	8	5	....	....	4	$19\frac{4}{10}$

29 Minden	6½ w	1½	10	15	24	16 m	1 w	16	1	15	1	14	15	....	....	1	15	88	4	20
30 Mitchell	7 w	1	7	24	33	20 m	4 d	11	7	4	6	4	10	2	8	1	....	125	5	19
31 Mt. Forest	7 w	1	18	20	21	20 m	2 d	19	10	9	10	9	19	2	12	5	....	115	4	19
32 Morrisburgh	7 w	1⅔	16	16	20	28 m	1 w	20	8	12	8	12	20	1	9	10	....	150	......	19⅔
33 Napanee	6 w	1⅙	9	20	22	25 m	1 d	10	4	6	4	6	10	1	3	6	....	200	11	18⅘
34 Newmarket	6 w	1¼	10	22	26	20 m	1 w	12	6	6	6	5	11	2	9	1	....	125	16	20
35 Norwood	6 w	1½	12	18	32	25 m	4 d	21	9	12	9	12	21	1	17	3	...	130	4	19
36 Orangeville	7 w	1	14	25	30	20 m	1 w	16	10	6	8	5	13	....	14	2	....	130	7	19½
37 Owen Sound	4 w	1¼	17	18	19	20 m	2 d	18	7	11	6	11	17	3	14	1	....	...	2	19
38 Parry Sound	4 w	3	14	20	30	20 m	1 d	21	4	17	4	17	21	....	2	.. .	19	200	17	19
39 Perth	7 w	1⅓	20	25	36	20 m	1 w	29	6	23	6	23	29	....	24	5	....	125	7	20
40 Picton	6 w	1	16	18	12⅔	20 m	3 d	11	9	2	9	2	11	1	8	2	....	135	14	$18\frac{7}{12}$
41 †Plantagenet	3 w	3	8	6	15	30 m	2 d	19	9	10	8	9	17	....	....	....	17	...	.. ..	$18\frac{4}{19}$
42 Port Hope	6 w	1	20	16	28	20 m	1 w	36	8	28	6	28	34	2	22	12	....	....	16	$19\frac{9}{28}$
43 Port Perry	6 w	1	14	20	21	20 m	5 d	15	5	10	3	9	12	2	6	4	....	125	12	20
44 Prescott	4 w	1¼	11	20	25	25 m	2 d	14	4	10	4	10	14	1	11	2	....	160	8	19
45 Renfrew	7 w	1¼	14	17	19	20 m	1 w	16	4	12	4	12	16	2	9	4	1	125	13	18½
46 Richmond	5 w	3	7	21	21	20 m	6 d	7	2	5	2	5	7	....	6	1	....	150	2	19
47 St. Thomas	5 w	1	11	22	22	20 m	2 d	30	12	18	11	18	29	2	23	7		...	25	19
48 Sarnia	6 w	1¼	24	28	16	20 m	3 d	14	4	10	4	10	14	....	11	3	....	...	.. ..	19½
49 Simcoe	3 w	1⅓	12	20	23⅓	20 m	2 d	14	8	6	8	6	14	1	11	2	....	160	12	$19\frac{5}{14}$
50 Stratford	5 w	1¼	43	20	13	20 m	1 w	27	4	23	3	20	23	2	22	3	....	....	11	18½
51 Strathroy	6 w	1½	22	30	32	20 m	4 d	24	8	16	8	16	24	1	19	4	....	175	10	19⅞
52 Toronto	5 w	40 m	......	20	15	20 m	1 d	41	....	41	....	39	39	4	43	4	...	....	21	19
53 Toronto Junction	6 w	1	15	18	38	20 m	3 d	32	12	20	12	20	32	5	21	6	....	150	..	19
54 Vankleekhill	5 w	2	12	15	16	20 m	1 w	13	6	7	6	7	13	....	4	3	6	130	5	22
55 Walkerton	6 w	1½	19	18	19	20 m	4 d	22	11	11	11	11	22	4	10	8	....	130	22	$18\frac{9}{10}$
56 Whitby	6 w	1⅓	17	28	12	20 m	1 w	7	3	4	3	4	7	1	5	1	....	125	2	19
57 Windsor	8 w	1	13	28	*47	20 m	1 w	22	7	15	6	13	19	7	8	4	3	450	12	19¼
58 Woodstock	6 w	1½	16	29	27	25 m	4 d	15	6	9	6	9	15	1	13	1	....	....	11	19⅓
59 †R. C. S. S. Ottawa	......	......	.....	......	.....	......	.....	19	....	19	....	19	19	....	....	....	19	....	....	....
Total	......	.....	.....	...	.....	......	.....	1,031	348	683	325	653	978	....	....	....	....	....	.....	19 Av.

*No report. † French Training School.

APPENDIX B.—*PROCEEDINGS FOR THE YEAR 1900*

I. ORDERS IN COUNCIL.

(1) Orillia High School to rank as a Collegiate Institute. (Approved, 17th January, 1900.)

(2) Appointment of Mr. W. C. Robertson as caretaker of London Normal School. (Approved, 26th January, 1900.)

(3) Appointments to the staff of the London Normal School: Mr. Stephen Kelso Davidson, Teacher of Drawing; Mr. Ernest F. R. Copeman, Physical Instructor; Miss Agnes MacKenzie, Teacher of Kindergarten Principles: and Miss Nellie Heffernan, Stenographer. (Approved, 16th February, 1900.)

(4) Appointment of Mr. Wm. Houston, M.A., as Inspector of Public Schools for Manitoulin Island, etc.; also granting of a Public School Inspector's Certificate to Mr. Houston. (Approved, 3rd March, 1900.)

(5) Appointment of Mr. Telesphore Rochon, B.A., as Inspector of Bilingual Training and Elementary Schools. (Approved, 25th June, 1900.)

(6) Agreements with the Canada Publishing Company, Limited, respecting The Public School Grammar, The Public School Geography, The Public School Drawing Course, and The High School Grammar. (Approved, 8th June, 1900.)

(7) High School established at Fort William. (Approved, 16th August, 1900.)

(8) Agreement with The Copp Clark Company, Limited, respecting The High School French Grammar and Reader. (Approved, 16th August, 1900)

(9) Appointment of Mr. Arthur Heeney as Engineer of the Ottawa Normal School. (Approved, 26th September, 1900.

(10) Appointment of Mr. Michael O'Brien as Inspector of Separate Schools. (Approved, 16th November, 1900.)

II. MINUTES OF DEPARTMENT.

(1) Granting of Second Class Professional Certificate to Miss Lucy Eleanor Potter, B.A., McGill. (Approved, 2nd May, 1900.)

(2) Granting of certificates to the following students of the Ontario Normal School of Domestic Science and Art, Hamilton: Miss N. C. Ross, B.A., Miss C. E. Fleming, B.A., Miss I. M. Hunter, Miss F. K. Bowditch, graduates in Domestic Science and Educational Sewing; and Miss G. Sutherland, graduate in Domestic Science. (Approved 31st July, 1900.)

(3) Granting of a Second Class Professional Certificate to Mr. Arthur Martin, B.A., Manitoba. (Approved, 14th August, 1900.)

(4) Text book regulations. (Approved, 21st August, 1900.

(5) Granting of a Public School Inspector's Certificate to Mr. David Chenay, valid for the inspectorate of N. Essex (No. 1). (Approved, 9th November, 1900.)

(6) Granting of a Second Class Professional Certificate to Mr. George Hindle, B.A. (Approved 20th December, 1900.)

III. CIRCULARS FROM THE MINISTER.

EXAMINATIONS.

INSTRUCTIONS TO PRESIDING EXAMINERS, 1900.

☞ The Presiding Examiners are *requested to peruse carefully* the following instructions and see that they are fully carried out:

(1) Each Inspector, or such other person as may be appointed by the Minister, shall himself, in person, receive from the Department or the Inspector, the examination papers, and shall thereupon be responsible for the safe keeping of the parcel containing the same, unopened, until the morning of the first day of the examination.

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(2) On the receipt of the bag containing the question papers the Presiding Examiner will see that *the seal is intact.* The bag can be opened by breaking the wire close to the seal, and when opened on the first day of the examination, the names and numbers of the envelopes containing question-papers should be verified with the time-table.

(3) The Presiding Examiner will satisfy himself that all necessary arrangements are made by the School Board in due time for the examination. If the trustees have not placed a clock in each room used for examination purposes the Presiding Examiner shall have power to hire the use of one for each room during the time required for the examination, and charge the same as part of the expenses of the examination.

(4) The Presiding Examiner shall, if there is sufficient accommodation and if a sufficient number of papers has been received, admit candidates that through some oversight did not send their applications to the Inspector. The names of such candidates are to be entered in the report blank specially provided, with such information as is required of the other candidates. This report blank and the required part of the fee, with one dollar additional as provided, should be sent by the Presiding Examiner to the Education Department. The balance of the fee should be sent to the Board that bears the expense of the examination.

(5) The Presiding Examiner shall exercise necessary viligance at all times while the candidates are engaged, and he *shall not give his attention to any work other* than that which pertains to his duties as Presiding Examiner. He shall take all necessary care to render it impossible for the instructions to candidates to be violated without his knowledge. This instruction (5) is to be observed however small may be the number of candidates.

(6) It is imperative that the regulations be enforced by the Presiding Examiner and strictly observed by the candidates. In particular, the examination papers shall be distributed, and the answer papers collected *punctually* at the time indicated in the timetable. The Presiding Examiner has no authority to deviate from the official time-table.

(7) In the examination room candidates, whether writing on the same subject or on different subjects, shall be seated at least five feet apart. All diagrams or maps having reference to the subject of examination shall be removed from the room, and books, papers, etc., removed from the desks; all arrangements shall be completed, and the necessary stationery distributed at least *fifteen minutes* before the time appointed for the commencement of the first subject of the examination, and at least *five minutes* before each other subject is begun.

(8) No person except the Examiners and any necessary attendants shall be present with the candidates in any room at the examination; and at least one Examiner shall be present during the whole time of the examination in each room occupied by the candidates.

(9) The Presiding Examiner shall, as indicated on the time-table, read to the candidates their duties, shall draw attention to any feature of them that may require special care during the examination, and shall be explicit in giving instructions to the candidates as to the manner in which the slips are to be attached to the envelopes. Great care should be taken in distributing the proper number of envelopes and in accounting for such envelopes as have been distributed. The instructions (5), (6) and (7) for candidates are also instructions to Presiding Examiners.

(10) *Punctually* at the time appointed for the commencement of each examination, the Presiding Examiner shall, in the examination room and in the presence of the candidates and other examiners (if any), break the seal of the envelopes containing the examination papers, and give them to the other Examiners and the candidates. The papers of only the subject or subjects required shall be opened at one time. Until the examination in the subject is over, no examination papers, other than those which the candidates receive, shall be taken out of the room.

(11) *Punctually* at the expiration of the time allowed, the Examiner shall direct the candidates to stop writing, and cause them to hand in their answer papers *immediately* duly fastened in the envelopes.

(12) The Examiner shall keep upon his desk the tally-list (check-list of candidates and subjects) and as each paper in any subject is handed in, (and the Examiner should carefully note the superscription of the envelope—the subject and the candidate's name), he shall check the same by entering the figure "1" opposite the name of the candidate.

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After the papers are handed in the Examiner shall not allow the envelopes to be opened, and he shall be responsible for their safe keeping until transmitted to the Education Department, or placed in the hands of the Presiding Examiner.

(13) For special instructions *re* the examinations in Botany, Stenography, Chemistry, Biology, etc, see the confidential circulars, which are forwarded to each Presiding Examiner prior to the examinations.

Reports, Etc.

(14) The Presiding Examiner shall report to the Education Department at the close of the examination in the "Remarks" column of the Diagram Blank, any particulars in which the Instructions, etc., were not observed and he shall mention any facts regarding the examination that he deems expedient to have brought before the Board of Examiners. The Presiding Examiner and his Assistants shall sign a declaration that in all other respects the Instructions and Regulations were fully complied with.

(15) The Presiding Examiner as part of his report to the Department shall send a diagram of each room on the forms provided, showing the position occupied by each candidate and Presiding Examiner during each Examination.

(16) The Presiding Examiner shall not arrange the answer papers according to subjects, but shall arrange them so that all the answers of each candidate for each Examination shall be sent altogether and *in the order that their names appear* on the list of candidates for that examination. To facilitate this, elastic bands have been supplied, one for each candidate's set of answers.

(17) The prompt return to the Education Department of the answers at the close of the respective Examinations is essential, and may be greatly facilitated if the answers are sorted at the close of each day's examination. All diagrams and reports (*except the tally-lists*) should be forwarded to the Department *by post* on the respective days that the answers are forwarded. The tally-list of each Examination should be returned in its respective bag with the candidates' answer envelopes.

(18)—(*a*) The answers of the candidates taking the (*a*) Part I. Junior Leaving (Public School Leaving), (*b*) the Part I. Junior Matriculation and (*c*) the Part II. Commercial Diploma Examinations, together with the corresponding tally-list, shall be returned *in separate parcels*, at the close of those examinations, in one of the bags provided.

(*b*) The answers of the candidates for (*a*) the Part II. Junior Leaving (*b*) the Part II. Junior Matriculation and (*c*) the Senior Leaving or Honor Matriculation Examinations, (*d*) the Commercial Specialist Examination, together with the corresponding tally-lists, shall be returned, *in separate parcels*, at the close of those examinations, in one of the bags provided.

(*c*) The answers of scholarship candidates, in the Part I., Part II., or Honor papers. shall be enclosed in the envelopes specially provided, shall be made up in a *separate parcel* and shall be returned to the Department in the same bag as the Part II. Matriculation answers.

(*d*) Each bag shall be so folded and tied that the words "The property of the Education Department" will be outwards. The shipping tag should be securely attached to the strap on each bag.

(*e*) All express charges must be prepaid, and no commercial value should be placed upon the bags and contents.

(*f*) All surplus examination papers may be given at the close of the examination to the Principal of the school.

Expenses of the Examination.

The Treasurer of the High School Board or of the Public School Board of the school where the examination is held shall pay on the certificate of the Public School Inspector, all the expenses of the examination which shall include the following:—

(1) For preparing the list of candidates, the Inspector shall be entitled to the remuneration of $2.00, provided that the number of candidates writing does not exceed twenty. For each additional twenty candidates or fraction of that number, the Inspector

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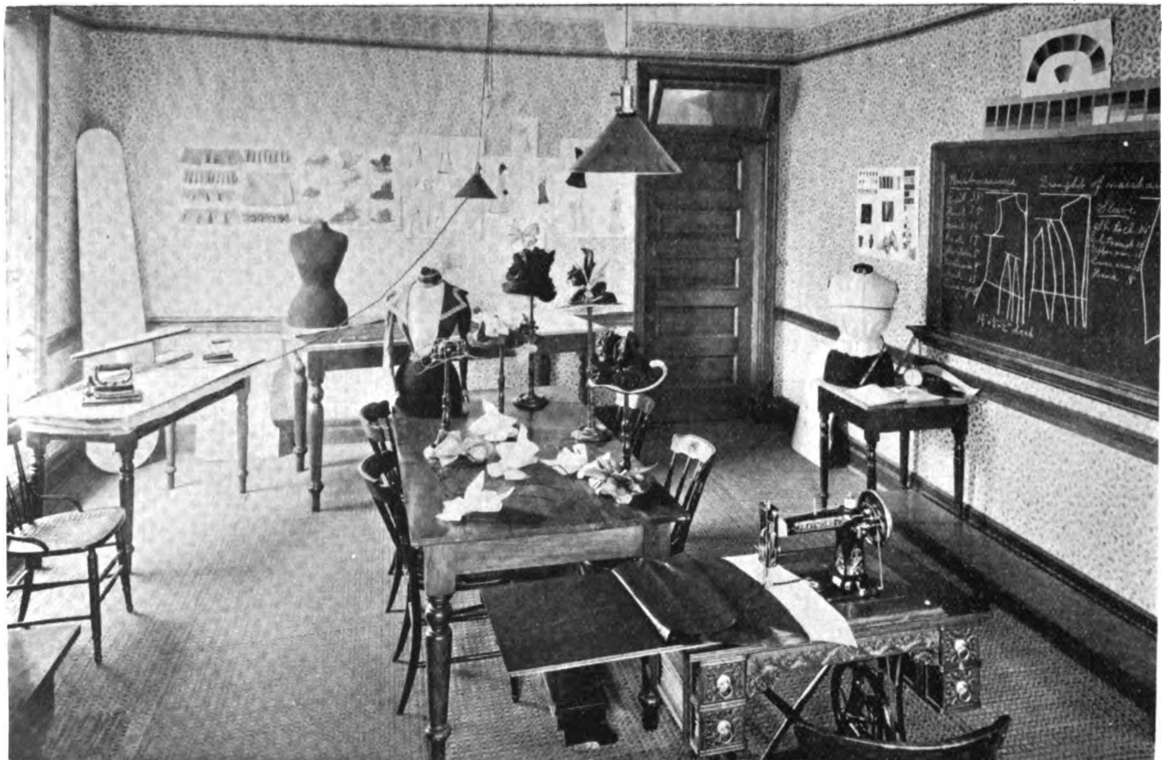

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shall be entitled to an additional dollar. It is to be understood that the number of applications received, and not the Examinations on which candidates write, will determine the amount paid for this service.

(2) For conducting the Examination each Presiding Examiner shall be entitled to $4.00 a day and actual travelling expenses, which shall include railway fare or the ordinary cost of their conveyances.

(3) For meeting the incidental expenses of the examination, the cost of stationery, etc., and the payment for any additional services required during the examination.

Instructions to Candidates

(1) Each candidate shall satisfy the Presiding Examiner as to his personal identity before the commencement of the second day's examination, and any person detected in attempting to personate a candidate shall be reported to the Department.

(2) Candidates shall be in their allotted places before the hour appointed for the commencement of the examination. If a candidate be not present till after the appointed time, he shall not be allowed any additional time. No candidate shall be permitted, on any pretence whatever, to enter the room after the expiration of an hour from the commencement of the examination.

(3) No candidate shall leave the room within *one hour* after the distribution of the examination papers in any subject; and if he then leave he shall not be permitted to return during the examination on such subject.

(4) Every candidate shall conduct himself in strict accordance with the regulations. Should he give or receive any aid or extraneous assistance of any kind, in answering the examination questions, or should he leave his answer exposed so that any candidate may copy from him he will forfeit any certificate he may have obtained. He shall also be debarred for two years from writing at any examination conducted by the Education Department.

(5) Candidates are reminded that should any candidate be detected in talking or whispering, or making signs to another candidate, or, in copying from another, or allowing another to copy from him, or in having in his possession, when in the room, any book, notes, or anything from which he might derive assistance in the examination, it shall be the duty of the Examiner if he obtain clear evidence of the fact at the time of the occurrence, to cause such candidate at once to leave the room; and such candidate shall not be permitted to enter during the remaining part of the examination, and his name shall be struck off the list. If, however, the evidence be not clear at the time, or be obtained after the close of the examination, the Examiner shall report the case to the Department.

(6) Candidates are also reminded that the Presiding Examiner is not allowed to make *any explanation* or other statement regarding the probable meaning of any question or to *give any advice* as to what questions should be undertaken by the candidates or how any question should be answered.

(7) Should any error appear to have been made in any question paper *no attention* shall be drawn to it during the time of the examination by either the Presiding Examiner or any of the candidates. Candidates may, however, at the end of the examination period submit the matter to the Presiding Examiner who, if he considers it necessary, will report on the matter to the Department at the close of the examination.

(8) Every candidate shall write the subject of examination very distinctly at the top of each page of his answer paper, in the middle. If a candidate write his name or initials, or any distinguished sign or mark on his answer papers or use any other paper or ink than that provided by which his identity might be disclosed or insert in the envelope any matter not pertinent to the examination, his examination will be cancelled.

(9) Each candidate, in preparing his answers, shall write on one side only of each sheet, shall page the sheets in each subject, shall write distinctly, on the last sheet, the total number of sheets enclosed in the envelope, shall fold them once across, place them in the envelope provided by the Department, seal the envelope, write on the outside of the envelope the subject of examination only, and on the slip provided, his name in full (surname preceding), and then securely fasten the slip to the envelope, as instructed by the Presiding Examiner.

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Extracts from Instructions to Applicants and Inspectors.

Fees.

Part I. Junior Leaving (Public School Leaving) Examination, $2. Part I. Junior Matriculation Examination, $2. Part II. Junior Leaving or Part II. Junior Matriculation Examination, $5. Senior Leaving Examination, Part I. and II., each $3; taken together, $5. Commercial Diploma Examination, Part II., $2. For candidates for examination in the additional subjects (not to exceed four) for Matriculation into any University or Learned Profession, the fee shall be $2. If the fees for a candidate amount to more than $5, only $5 will be required.

Attention is directed to the scale of fees to be paid by candidates. When the fee is $5, $4, $3, or $2, the amount to be sent to the Department is $3, $2, $2, or $1, respectively. The balance of fees received is to be forwarded to the High School Board or other body that bears the expenses of the examination.

Applications will not be received by the Inspector after the date mentioned, and candidates are reminded that they should in no case forward their applications to the Education Department. If the candidate should, through an oversight, neglect to have his application duly sent to the Inspector, he may present himself at the examination, when the Presiding Examiner is at liberty to admit him, provided there is the necessary accommodation, and that a sufficient number of examination papers has been forwarded. An additional fee of $1 will be exacted by the Presiding Examiner from a candidate who presents himself in this way.

Toronto, January 1st, 1900.

CIRCULAR TO INSPECTORS.

Empire Day.

Gentlemen,—I earnestly invite your co-operation in having "Empire Day" duly celebrated this year in all our schools. In the other Provinces of Canada, as well as in Ontario, the 23rd of May, 1899, inaugurated an important event in the cultivation of British patriotism among the Canadian people. As intimated, last year the Education Department of Ontario, on the 1st of March, 1899, adopted the following Minute:

"The school day immediately preceding the 24th of May shall be devoted specially to the study of the history of Canada in its relation to the British Empire, and to such other exercises as might tend to increase the interest of the pupils in the history of their own country and strengthen their attachment to the Empire to which they belong—such day to be known as 'Empire Day.'"

According to this Minute, "Empire Day" this year falls on Wednesday, the 23rd of May, and it is desirable that every suitable means should be adopted to foster among the youth of our country a high national sentiment. This subject is specially important this year, since the struggle in which England is now engaged, and in which Canada is taking a prominent part, will call forth increased love for British institutions. Canada is helping to make history, and the youth of our country should be taught fully to appreciate their positions as citizens of the British Empire. It should be understood that true patriotism does not consist in empty shouts of acclaim, in mere professions of loyalty or in any spirit of national boasting. The patriotism to be cultivated among the children of our schools should be that which results from a just appreciation of what the nation has become because of its spirit of freedom, its laws, its customs, its form of government and its triumphant onward march as a great civilizing agency. For the children of our schools to appreciate rightly what they owe to the British Empire it is necessary for them to know something of its traditions, its perils, its stages of growth, its sources of power and its many glorious achievements. In other words, the patriotism to be cultivated in our schools should be broad, and marked by intelligence and high moral principle.

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It is not necessary that the manner in which "Empire Day" is to be observed should be indicated in detail. As was done last year, some intimation of the following nature might guide the teachers and trustees:

The Forenoon.

In each of the classes, part of the forenoon might be occupied by the teacher taking as his subject the British Empire, and discussing in a general way, for example:—its extent and resources; its history and institutions; its literature and distinguished statesmen, authors, soldiers, etc.; the excellence of the British form of government, and the privileges which all British subjects enjoy; the great extent and magnificent resources of Canada, together with some account of its system of government—Dominion, Provincial, Municipal, Educational; historical incidents in connection with the development of the Dominion; and the part it has taken in the unity of the Empire. An historical reference to the Union Jack, explaining when and how it became the national emblem, would be opportune. It should be understood that the aim of the teacher, in any outline he may give to his pupils, will be to cultivate that spirit of Canadian patriotism which will be marked by intelligence and the highest moral sentiment, and which will be adapted to the age and attainment of the pupils.

The Afternoon.

A suitable programme can easily be arranged for the afternoon, the exercises commencing at 2 30 p.m. These might consist of patriotic recitations, songs, readings by the pupils, and addresses by trustees, clergymen, and such other persons whose services may be available. At the afternoon exercises, the trustees and public generally should be invited to be present, and during both forenoon and afternoon the British flag or Canadian ensign should be hoisted over the school building. With these objects in view, you will kindly give the necessary directions to the teachers of schools under your supervision, in order that throughout the entire Province "Empire Day," in the closing year of the century, may be duly celebrated.

TORONTO, March, 1900.

DEPARTMENTAL INSTRUCTIONS.

HIGH SCHOOL ENTRANCE EXAMINATION, 1901.

General.

1. The High School Entrance examination for 1901 will begin Wednesday, the 26th of June, at 8.45 a m., and will be conducted under the provisions of Section 38 of the High Schools Act and Sections 23-27 of the Regulations, subject to the instructions herein contained.

2. Candidates who purpose writing at the examination must notify the Public School Inspector before the 1st of May.

3. No teacher, who has pupils writing at the High School Entrance examination, shall be eligible as Examiner where such pupils are writing.

4. When the County Council recommends the holding of an examination at any place other than the High School, the presiding examiner shall be paid the sum of $3 per diem, and travelling expenses, for conducting such examination, and the examiners shall be allowed the sum of $1 per candidate for reading the examination papers. It shall be lawful for the County Treasurer to pay all the expenses of such examination on the certificate of the County Inspector.

5. The course of study prescribed is that given in the Revised Regulations of 1896. The paper in Arithmetic will include such questions as will specially test the accuracy of the candidates in the simple rules, as well as their knowledge of the subject; and the paper in Dictation will call for the study of the authorized Spelling Book.

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6. The following selections in Literature from the Fourth Book have been prescribed for the examination of 1901.

I. Tom Brown; V. Pictures of Memory; X. The Barefoot Boy; XVIII. The Vision of Mirza—*First Reading*; XX. The Vision of Mirza—*Second Reading*; XXIII. On His Own Blindness; XXVI. From "The Deserted Village"; XXXII. Flow Gently, Sweet Afton; XXXVII. The Bell of Atri; XLII. Lady Clare; LXVIII. The Heroine of Vercheres; LXXVI. Landing of the Pilgrims; LXXXIX. After Death in Arabia; XCI. Robert Burns; XCIV. The Ride from Ghent to Aix; XCVI. Canada and the United States; XCVIII. National Morality; CI. Scene from "King John."

The following selections from the Fourth Reader for Memorization:

XIII. The Bells of Shandon; XXXI. To Mary in Heaven; XL. Ring out, Wild Bells; XLII. Lady Clare; XLVI. Lead, Kindly Light; LXVI. Before Sedan; LXXIII. The Three Fishers; CIII. To a Skylark; CV. Elegy, Written in a Country Churchyard.

7. The following selections from the Fourth reader of the Canadian Catholic Series may be substituted for the preceding:—

VIII. Hunting the Deer; XVII. My Playmate; XX. The Exile of Erin; XXIII. The Destruction of Sennacherib; XXXI. The Death of Paul Dombey; XXXIII. Dickens in Camp; XXXVI, An April Day; XLI. Yarrow Visited; LIX. Ye Mariners of England; LX. Wolfe at Quebec; LXIV. The Water Fowl; LXV. The Journey to Bethlehem; LXVII. Macarius the Monk; LXXIII. Our New Neighbors; LXXIX. Alec Yeaton's Son; LXXXV. A Psalm of Life; XCI. May-Day; XCVI. The Virgin.

For memorization:—

VI. Lead, Kindly Light; XVIII. Abou Ben Adhem and the Angel; XXVII. Under the Violets; XLVII. Love of Country; XCIII. God the Comforter; CI. Inscription for a Spring; CX. Our Lady in Italy; CXV. The Bells of Shandon; CXVIII. Elegy, Written in a Country Churchyard.

Duties of Inspector.

8. The Inspector shall notify the Department not later than the 3rd day of May in each year, of the number of persons desiring to be examined at any High School or other authorized place within his jurisdiction.

9. In any city or town forming a separate inspectoral division, the Inspector or Inspectors of such city or town shall preside at the examinations, and in conjunction with the Board of Examiners for such city or town, shall read the papers and report to the Department.

10. In counties in which more High Schools than one are situated, the Inspector for the county shall elect at which High School he will preside, and shall notify the Department of the choice he makes, and in each of the other High Schools the Principal of the High School shall preside.

11. In the case of examinations affiliated with a High School, the Inspector, within whose district such affiliated examinations are held, shall appoint presiding examiners, who shall be teachers in actual service, notice of which shall be sent to the Education Department; and such Inspector, together with the examiners of the High School with which the examination is affiliated, shall be the Board of Examiners in all such cases.

12. Where, from the number of candidates, or any other cause, additional presiding examiners are required, the Inspector shall make such appointments as are necessary, preference being given to the other members of the Board of Examiners. The Inspector shall not appoint as presiding examiner any teacher who has taken part in the instruction of any of the candidates in the room where he presides, or who is not in actual service.

13. Where more examinations than one are held in an inspectoral division, the papers will be sent by the Education Department to the Inspector or the presiding examiner, as the case may be.

14. The parcel containing the examination papers shall not be opened till the morning of the examination day, nor shall any envelope containing the papers in any subject be opened until the time appointed in the time-table for the examination in such subject.

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Duties of Presiding Examiners.

15. To be in attendance at the place appointed for the examination at least fifteen minutes before the time fixed for the first subject, and to see that the candidates are supplied with the necessary stationery, and seated so far apart as to afford reasonable security against copying.

16. To open the envelope containing the papers in each subject in full view of the candidates, at the time prescribed, and to place one paper on each candidate's desk.

17. To exercise proper vigilance over the candidates to prevent copying and to allow no candidate to communicate with another, nor permit any person except a co-examiner, to enter the room during examination.

18. To see that the candidates promptly cease writing at the proper time, fold and endorse their papers properly, and in every respect comply with the instructions herein contained.

19. To submit the answers of the candidates to the examiners, according to the instructions from the Board.

Duties of Candidates.

20. Every candidate should be in attendance at least fifteen minutes before the time at which the examination is to begin, and shall occupy the seat allotted by the presiding examiner. Any candidate desiring to move from his allotted place or to leave the room, shall first obtain permission from the presiding examiner to do so. Any candidate leaving shall not return during the examination of the subject then in hand.

21. Every candidate shall write his answers on one side only of the paper, and shall number each answer. He shall arrange the sheets numerically, according to the questions, and fold them once crosswise, endorsing them with his name, the name of the subject, and the name of the place at which he is examined. No paper shall be returned to a candidate after being placed in the hands of the presiding examiner

22. Any candidate who is found copying from another or allowing another to copy from him or who brings into the examination room any book, note, or paper having any reference to the subject, on which he is writing, shall be required by the presiding examiner to leave the room and his paper and the papers of all the guilty parties shall be cancelled.

Duties of Examiners.

23. The papers of the different candidates shall be so distributed that the same examiner shall read and value the answers in the same subject throughout.

24. Marks are to be deducted for mis-spelt words and for want of neatness as indicated in regulation 25, and on the question papers.

25. Each examiner shall mark distinctly, in the left hand margin, the value assigned by him to each answer or partial answer, shall sum up the total on each page at the foot of the margin, and shall place the general total on the back of the outside sheet, indicating the deductions for mis-spelt words, and the deductions for want of neatness thus *e. g.* History, 60—5sp—3n=52, and initialing each set of papers examined.

26—(*a*) The reports of the examiners are to be sent (*by mail*) to the Education Department, on or before the 20th day of July, by the Public School Inspector.

(*b*) The bag which contains the question papers is to be returned to the Department (charges prepaid) *at the same time* as the reports are sent.

(*c*) The answer papers of candidates, unless when specially requested, are not to be forwarded to the Department, but are to be retained by the Inspector until October 1st, *after which no case is to be re-considered.*

(*d*) The Inspector shall issue a certificate to each candidate who passes the High School Entrance examination.

(*e*) The names of all candidates admitted by the Board of Examiners may be published; immediately after (*but not before*) the reports have been transmitted to the Education Department.

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TIME TABLE.

High School Entrance.

First Day.

A. M. 8.45 .... Reading Regulations.
9.00—11.00 .... English Grammar.
11.10—12 40 .... Geography.
P. M. 2.00— 4 00 .... Composition.
4.10— 4 40 .... Dictation.

Second Day.

A. M. 9.00—11.00 .... Arithmetic.
11.10—12.20 .... Drawing.
P. M. 1.30— 3.00 .... History.

Third Day.

A. M. 9 00—11 00 .... English Literature.
11.00—11.40 .... Writing.
P. M. 1.30— 3 00 .... Physiology and Temperance.

☞ Reading may be taken on the above days at such hours as may suit the convenience of the examiners.

MEMORANDA.

The Public School Leaving examination, which will correspond to the examination for Part I of Junior Leaving Standing, will begin Tuesday, the 2nd day of July, 1901, at 8.45 a.m. All candidates for this examination must, as provided by * Regulation 28, make application on forms to be obtained any time in April from the Public School Inspector. The application forms, duly filled up, must be returned to the Inspector not later than the 24th day of May. The answer papers of candidates will be examined as provided by Regulations 82 and 83. Candidates who fail at this examination may, under provisions of Regulation 29, be awarded High School Entrance certificates. The following are the amended Regulations regarding the examination :

Public School Leaving Examination.

The Public School Leaving examination will hereafter be identical with the examination prescribed for Part I of Junior Leaving Standing. Public School Leaving Certificates will be issued by the Public School Inspector to all pupils of Public Schools in his inspectorate who pass the examination of Part I of Junior Leaving Standing. The present holders of Public School Leaving certificates will be entitled to certificates of having passed the examination of Part I, Junior Leaving Standing, by passing the examinations in Arithmetic, and Mensuration, Grammar and History, the prescribed percentage on the total of these subjects being also exacted.

Part I, Junior Leaving Standing.

The subjects prescribed for Part I of Junior Leaving Standing are the following: Reading, Drawing, Geography, Botany (or Agriculture), Writing with Book-keeping and Commercial Transactions, English Grammar, English Literature, Arithmetic and Mensuration, English Composition and History. The course in Agriculture will include what is taken up in the authorized text book as far as page 73. The course in the other

*A copy of the High and Public Schools Acts, including the Regulations, was sent in 1896 to each High, Public and Separate School Board; to each Principal of a Collegiate Institute or High School; to each Principal of a County Model School, and to each Public School Inspector. As only a limited supply of the Regulations can be furnished, reference should be made to copies already sent as above mentioned.

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subjects will be based as heretofore upon the work prescribed in the Regulations for Forms I and II, subject to requirements for examinations hereinafter mentioned. No examination will be held in Reading, English Literature, Drawing, Book-keeping, Botany, or Agriculture, but no name of a student who has not given due attention to these subjects is to be included in the confidential report of the Principal.

No grant to a High School or to a Continuation Class will be paid until the Principal and Chairman of the School Board report that each obligatory subject of the course whether prescribed for examination or not, has, in their judgment, received due attention on the part of the pupils while attending the school.

It is expected that throughout the course, until pupils have completed what is required for Part I of Junior Leaving Standing, at least two half-hour periods per week shall be given regularly to Reading, and an equal time to English Literature. Regarding Drawing, Book-keeping, Botany or Agriculture, at least two half-hour periods per week for each of these subjects are to be given regularly to pupils enrolled in Form I of the High School or Form V of the Public School; that is practically during the first year of the course in preparation for Part I of Junior Leaving Standing.

Examination Requirements.

(Part I, Junior Leaving Standing.)

Geography.

The building up of the earth; its land surface; the ocean; comparison of continents as to physical features, natural products and inhabitants; relation of physical conditions to animal and vegetable products; and of natural products and geographical condition to the occupations of the people and national progress. Form, size and motions of the earth; lines drawn on the map, with reasons for their position; relation of the positions of the earth with respect to the sun, light and temperature; the air; its movements; causes effecting climate. Natural and manufactured products of the countries of the world, with their exports and imports; transcontinental commercial highways and their relation to centres of population; internal commercial highways of Canada and the chief internal commercial highways of the United States; commercial relations of GreatBritain and her colonies. Forms of governments in the countries of the world and their relation to civilization. One examination paper.

Arithmetic and Mensuration.

Proofs of elementary rules in Arithmetic; fractions (theory and proofs); commercial Arithmetic; mental Arithmetic; Mensuration of rectilinear figures. One examination paper. (The questions will call for accuracy and will have special reference to the requirements of ordinary life.)

English Grammar.

Etymology and Syntax, including the inflection, classification, and elementary analysis of words and the logical structure of the sentence and paragraph; exercise chiefly on passages from authors not prescribed. One examination paper. (The questions will call for such an elementary knowledge of the subject as will be of special value in the ordinary use of the language.)

English Composition.

For examination purposes an essay of about two pages of foolscap on one of the themes prescribed by the examiners will be required. The penmanship, spelling, punctuation, construction of sentences, the logical arrangement of the thought, the literary accuracy and aptness of the language and the general plan or scope of the whole essay will be especially considered by the examiners. One examination paper.

History of Great Britain and Canada.

Great Britain and Canada from 1763 to 1885, with the outlines of the preceding periods of British History.

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The Geography relating to the History prescribed. One examination paper.

The following modifications are also made in the Revised Regulations, which came into force in October, 1896 :—

*Public School Course of Study.

The Public School course of study is amended so as to include Agriculture among the obligatory subjects in all rural schools for Forms IV and V; for the latter form the text-books are to be used by the pupils, but for the former the instruction is to be by conversation only. Agriculture will remain optional for all Public Schools in urban municipalities. Needlework, Domestic Economy, and Manual Training may be taken up in urban schools with the opproval of the trustees. In Poetical Literature the course for Form V will embrace such selections from the High School Reader as are recommended by the teacher. No special selections are prescribed by the Department. Where the trustees have provided books for Supplementary Reading, such works as are recommended by the teacher, under the direction of the Inspector, may also be read.

Continuation Classes.

Under the provisions of the Amendment of 1899 to the Public Schools Act, the course of study (Regulation 20) for the Continuation Classes is extended to include the subjects prescribed for Form II of the High School course. More advanced work of the High School may be taken up if requested by the trustees and approved by the Public School Inspector In class (*a*) the Principal must give regular instructions only to pupils in Form V or to those doing higher work. In the other classes, the teachers must have such qualifications as are approved by the Public School Inspector.

Hereafter (Regulation 21) there will be four grades of Continuation Classes, viz.: (*a*) Schools in which the Principal holds a First Class Certificate (unless occupying the position since April, 1899), and gives regular instruction only to pupils of Form V, or to those doing higher work. (*b*) Schools in which there are at least two teachers, and a class in regular attendance of at least ten pupils who have passed the High School Entrance examination. (*c*) Schools in which there are at least five; and (*d*) in which there are at least three, who have passed the High School Entrance examination and are in regular attendance.

No grant will be paid for Continuation Classes unless the Inspector (who shall examine the statements signed, as above mentioned, by the Principals and Chairmen of the Boards) reports that the obligatory subjects whether prescribed for examination purposes or not, have received proper attention. The grant will be paid according to the nature and extent of the work done, and not on the results of examinations.† In order that a school may obtain the grant, it will be necessary that the minimum number of pupils be enrolled during each month of the full academic year ending in June.

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*See Schedule A.—Public School Course of Study of the Revised Regulations of 1896. It should be remembered that Algebra and Geometry are obligatory subjects of Form V. The time to be devoted to these subjects as well as to Geography, Arithmetic and Mensuration, English Grammar, English Composition, History of Great Britain and Canada, is left to the discretion of the teacher, who should be guided by the Inspector (Regulation 17). Regarding Reading, English Literature, Drawing, Bookkeeping, Botany or Agriculture, the minimum amount of time, as specified herein for Part I Junior Leaving Standing, must be given.

†It should be understood that no pupil, unless he intends to become a teacher, is required to write at the examination for Part I Junior Leaving Standing (Public School Leaving). No grant will hereafter be paid to a school on account of the success of the pupils at the Public School Leaving examination, and a school entitled to rank in one of the grades for Continuation Classes, will receive its share of the appropriation for such classes, even if no pupils from the school should become candidates at any examination. Forms of reports for Continuation Classes may be obtained from the Inspector in April. These should be duly filled up and returned to the Inspector the 1st of July. The Legislative Grant for a Continuation Class will depend upon the number of the different grades in the Province, and cannot be determined until the County Inspectors make their reports for Continuation Classes to the Education Department. The report of the Inspectors will be due at the Department July the 10th, and if promptness is observed by teachers in making the necessary returns to the Inspector, the grants for Continuation Classes may be paid in August. It should be recollected that the success of pupils at the High School Entrance examination in June will in no way effect the question of whether or not a school is entitled to be placed in any of the grades for the academic year ending the same month.

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HIGH SCHOOL ENTRANCE EXAMINATIONS LITERATURE LESSONS—1902, 1903, 1904.

After 1901 the following provisions are to be observed respecting the High School Entrance examination in Literature :—

1. Exclusive of the quotation question, each paper will consist of two parts ; (a) one containing questions on a passage from the prescribed selections ; and (b) the other, questions on one or more passages from the rest of the reader ; and

2. The max. number of marks for (a) will be 25, and for the quotation question, 10 ; the other marks being assigned to the questions in the rest of the paper.

LITERATURE SELECTIONS.

Fourth Ontario Reader.

1902.—XV. Clouds, Rains and Rivers ; XIX. The Death of the Flowers ; XXXIII. The Skylark ; XXXIX. A Psalm of Life ; L. The Prairies ; LI. The Heroes of The Long Sault ; LIII. Scene from "Ivanhoe" ; LXXI. The Heritage ; LXXIV. Song of the River ; LXXVI. Landing of the Pilgrims ; LXXIX. The Capture of Quebec ; LXXXII. The Ocean ; LXXXV. Marmion and Douglas ; XC. Mercy.

1903.—X. The Barefoot Boy ; XVIII and XX. The Vision of Mirza ; XXIV. The Face against the Pane ; XXXVII. The Bell of Atri ; XXXVIII. The Discovery of America ; XL. Ring Out, Wild Bells ; XLIII. The Gulf Stream ; LXI. She was a Phantom of Delight ; LXIV. Ye Mariners of England ; LXXXVII. The Song of the Shirt ; LXXXIX. After Death in Arabia ; XCV. A Forced Recruit at Solferino ; XCVIII. National Morality.

1904.—VIII. The Battle of Hastings ; XXIII. On His Own Blindness ; XXVI. From "The Deserted Village" ; XXXIV. Death of Little Nell ; LXII. Lady Clare ; LIX. Yarrow Unvisited ; LX. To a Skylark ; LXIX. The Changeling ; LXXVIII. Riding Together ; LXXX. Waterloo ; LXXXIV and LXXXVI. King Richard and the Nubian ; XCII. Edinburgh after Flodden.

SELECTIONS FOR MEMORIZATION.

1902.—II. I'll Find a Way or Make It ; XI. The Evening Cloud ; XXI. Oft, in the Stilly Night ; XXXI. To Mary in Heaven ; XLVII. Rock of Ages ; LXVI. Before Sedan ; XCIV. The Ride from Ghent to Aix ; CV. Elegy, Written in a Country Churchyard.

1903.—V. Pictures of Memory ; XIII. The Bells of Shandon ; XXII. 'Tis the Last Rose of Summer ; " Breathes there a man with soul, etc." (page 79) ; XXXII. Flow Gently, Sweet Afton ; LII. Jacques Cartier ; LXXIII. The Three Fishers ; CV. Elegy, Written in a Country Churchyard.

1904.—VII. Boadicea ; XIV. Lament of the Irish Emigrant ; XXIX. For A'That and A'That ; XLVI. Lead, Kindly Light ; LIV. Lochinvar ; LXXXIII. The Influence of Beauty ; Sonnet—Night (page 302) ; CV. Elegy, Written in a Country Churchyard.

LITERATURE SELECTIONS

Canadian Catholic Fourth Reader.

1902.—VI. Lead, Kindly Light ; IX. The Barefoot Boy ; XXV. Going A-Maying ; XXXIII. Dickens in Camp ; XXXVIII. Song of the Camp ; XLIII. Free-Will and Habit ; LXVIII. The Reaper ; LXIX. Voyage of Columbus ; LXXII. King Robert of Sicily ; LXXXV. The Psalm of Life ; XCIV. The Combat ; XCV. Joan of Arc : C. The Chariot Race ; CVIII. The Church of God.

1903.—XIII. The Deserted Village ; XXI. Excelsior ; XXIX. In the Great Fur-Land ; XLI. Yarrow Visited ; LIV. The Ballad of Baby Bell ; LIX. Ye Mariners of

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England; LX. Wolfe at Quebec; LXIII. My Garden Acquaintance; LXVII. Macarius, the Monk; LXXVII. Lines on My Mother's Picture: XCVI. The Virgin; CIII. Conversion of England; CXIV. A Bell's Biography; CXVI. Veni Creator.

1904—XX. The Exile of Erin; XXIII. The Destruction of Sennacherib; XLVI. The Chase; LVI. The Heritage; LVII. Paradise and the Peri; LXV. The Journey to Bethlehem: LXXI. The Air and Water; LXXIII. Our New Neighbors; LXXXI. The Angelus; LXXXVI. Discovery of Lake Champlain; CIV. On His Blindness; CV. The Crusader and the Saracen; CVI. A Day in June; CXII. Ode to Autumn; CXIX. The Greatness of God.

SELECTIONS FOR MEMORIZATION.

1902.—XII. Give Freely; XVIII. Abou Ben Adhem and the Angel; XXXIX. In Memory of My Brother; XLVII. Love of Country; LXIV. The Waterfowl; LXXXI. The Angelus; CII. To the Night: CXVIII. Elegy Written in a Country Churchyard.

1903.—I. The Maple; III. The Four leaved Shamrock; VII. The Daffodils; XXVIII. The Fig Merchant; XLII. Home Thoughts from Abroad; XCIII. God, the Comforter; CX. Our Lady in Italy; CXVIII. Elegy Written in a Country Churchyard.

1904.—VI. Lead, Kindly Light; X. Flow Gently, Sweet Afton; XXXV. Step by Step; LI. Song of the River; LIII. As I Came Down from Lebanon; CI. Inscription for a Spring; CXV. The Bells of Shandon; CXVIII. Elegy, Written in a Country Churchyard.

TORONTO, August, 1900.

DEPARTMENTAL REGULATIONS,

APPROVED, AUGUST, 1900.

Text-books authorized for use in Public Schools, High Schools and Training Schools.

1. The text books named in Schedule "A" shall be the authorized text-books for Public Schools. Pupils taking any optional subject in the Public School course may use the text-book authorized in such optional subject. The text-books in French and German are authorized only for schools where the French or German language prevails and where the Trustees, with the approval of the Inspector, require French or German to be taught in addition to English. Text-books marked "optional" shall be introduced in the Public Schools only by resolution of the Board of Trustees. Books authorized in Forms I. and II. of the High School course may be used by pupils taking the corresponding subjects of Continuation classes.

2. The text-books named in Schedule "B" shall be the only authorized text-books in High Schools and Collegiate Institutes for the course of study prescribed in Forms I., II., and III. Books authorized for use in the Public Schools may be used in Forms I. and II.

3. The text-books named in Schedule "C" shall be the authorized text-books for Model Schools, Normal Schools and the Ontario Normal College. Only such books shall be used by the teachers-in-training as may be ordered by the Principal.

4. Any text-books used in any school on the 1st July, 1900, and recommended by resolution of the Trustees to be continued in use, shall be deemed as authorized in such school until further notice. The vertical or slanting copy books heretofore authorized, and published by the Rose Publishing Company, may be used in any Public School.

5. For religious instruction, either the Sacred Scriptures, or the Scripture Readings adopted by the Education Department, shall be used as prescribed by the Regulations of the Education Department.

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PUBLIC SCHOOLS (SCHEDULE A)

First Reader, Part I	$0 10
First Reader, Part II	0 15
Second Reader	0 20
Third Reader	0 30
Fourth Reader	0 40
High School Reader	0 50
Public School Arithmetic	0 25
Public School Algebra and Euclid	0 25
Public School Geography	0 75
Public School Grammar	0 25
Public School History of England and Canada	0 30
History of the Dominion of Canada, Clement (for Fifth Form)	0 50
Public School Drawing Course, each number	0 05
Public School Physiology and Temperance	0 25
Public School Copy Book—Casselman	0 07
Practical Speller—Gage	0 25
Public School Bookkeeping (*Black)	0 25
Public School Agriculture	0 30
Public School Domestic Science (optional)	0 50

French—English Readers

First Reader, Part I	$0 10
First Reader, Part II	0 15
Second Reader	0 25
Third Reader	0 35

German—English Readers.

Ahn's First German Book	$0 25
Ahn's Second German Book	0 45
Ahn's Third German Book	0 45
Ahn's Fourth German Book	0 50
Ahn's First German Reader	0 50

HIGH SCHOOLS AND COLLEGIATE INSTITUTES. (SCHEDULE B)

English.

High School Reader	$0 50
High School English Grammar	0 75
High School English Composition	0 50
High School Composition from Models	0 75

History and Geography.

High School Geography	$1 00
High School History of England and Canada	0 65
High School History of Greece and Rome	0 75
History of the Dominion of Canada—Clement	0 50

Mathematics.

High School Arithmetic	$0 60
High School Algebra	0 75
Elements of Algebra, McLellan	0 75
High School Euclid (Books I., II., III., 50 cents)	0 75

Classics.

First Latin Book and Reader	$1 00
Primary Latin Book and Reader	1 00
High School Beginner's Greek Book	1 50

**The book of forms, prepared by the same author to accompany this work, is not compulsory but optional only.*

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Moderns.

High School French Grammar and Reader	$1 00
High School German Grammar and Reader	1 00

Science.

High School Physical Science, Part I., 50 cents; Part II	$0 75
High School Botany, Part II	0 60
High School Chemistry	0 50

Bookkeeping and Drawing.

High School Bookkeeping	$0 60
High School Drawing Course, each number	0 10

Cadet Drill.

High School Cadet Drill (optional)	$0 40

TRAINING SCHOOLS. (SCHEDULE C.)

County Model Schools.

School Management, Millar	$1 00
Methods in Teaching, Edited by Tilley	1 50
Public School Physiology and Temperance	0 25
Psychology applied to Teaching, Baldwin	1 50
Steps in the Phonic System, Cullen & Niven	0 50
Elementary Phonetics, Burt	0 35
Elementary Treatise on Arithmetic, Taylor	0 50
Mental Arithmetic, McLellan & Ames	0 30
Algebraical Exercises, Barnes	0 30
Introductory Geometry, MacLean	0 50

Normal Schools.

Lectures on Teaching, Fitch	$1 00
School Management, Millar	1 00
Educational Reformers, Quick	1 50
Applied Psychology, McLellan	1 00
First Year at School, Sinclair	0 50
High School Cadet Drill Manual	0 40
Hints on Teaching Arithmetic, McLean	0 50
Public School Domestic Science	0 50

Ontario Normal College.

Applied Psychology, McLellan	$1 00
Education, Spencer	0 50
School Management, Millar	1 00
School Management, Landon	1 50
Educational Reformers, Quick	1 50
High School Cadet Drill Manual	0 40
Physical Culture, Houghton	0 50
Physical Education, McLaren, Part II., sections II. and III.	2 00

TEACHERS' READING COURSE FOR 1901. (SCHEDULE D.)

Intellectual and Moral Development of the Child, (Compayré)	$1 50
History of Education, (Seeley)	1 25
Anglo Saxons and Others, (Aline Gorren)	1 50

NOTE.—Candidates for admission to the Normal Schools in August, 1901, and in January. 1902, will be examined on the Books in the Teachers' Reading Course as above.

Toronto, August, 1900.

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FRENCH-ENGLISH SCHOOLS.

Hints on Teaching English to Junior French Classes.

1. *Oral Work.*

The teaching of Oral English should begin with the child's first week in school, and the object of making it serviceable and accurate should be kept steadily in view. In the beginning teach wholly through objects, choosing at first those most familiar to the child. The endeavor to teach by translation has never proved satisfactory with children, when a knowledge of the spoken language is aimed at. In the junior classes the answers of individuals, when correct, should be repeated in concert by all, also separately by some pupils, especially the dull or backward. In all language or object lessons lead pupils to use, as freely as possible, all the English they may have learned, to form their own statements, to vary the form of phrases or sentences, to ask questions, etc., encouraging all such attempts, however imperfect they may at first be. With young pupils, correct all mistakes instantly, in a kindly way, and have the proper form repeated, and if necessary drilled upon. The teacher should take special care to endeavor to secure correct pronunciation by setting a good example for imitation, and by giving thorough drill on the difficulties commonly met with, *e g. th*ree, ol*d* man, etc., even exaggerating such sounds if necessary. Above all it should be remembered that much of the success in this teaching will depend upon thorough and frequent drills and reviews. For this purpose the teacher should keep a list of all words, phrases or sentences gone over, especially with the junior class. The order in teaching should be as follows:—

1. Holding an object in plain view of the class, the teacher gives its name plainly and slowly; then the pupils pronounce its name (*a*) in concert after the teacher, (*b*) together without the teacher's help, (*c*) individually. Other objects are similarly treated, the number depending upon the ability of the class.

2. The teacher pronounces the name and the pupils show or hold up the object.

3. The teacher shows the object and the name is given by the pupils (a) together (b) separately. Do not rest content with class or concert answers; test every individual pupil very frequently.

4. Not too many objects should be given in each lesson, but the teacher should make sure that every child knows (a) the object when named, (b) the name when the object is given, the latter presenting the greater difficulty. Among the names to be first taken up are—(i) things in the school, (ii) familiar things of the home, (iii) parts of the body, (iv) articles of clothing worn by the children, (v) other common objects, *e g.*; 'apple, watch, stone, leaf,' etc. Later, pictures should be used to teach the names of common animals, vegetables, etc., etc. Pupils should learn about 150 words in the first three or four months of school life. Their progress later should be more rapid in proportion.

5. When the pupil has a fair stock of names, teach simple descriptive words, still by means objects, *e.g.*; a *short* pencil, a *long* stick; a *small* book, a *large* slate; a *red* dress. a *black* hat, etc. Related or contrasted terms are more easily taught in the same lesson,

6. *Simple* acts should be performed (a) by the teacher, (b) by the pupils, and described in full statements; *e.g.* the teacher, doing the act as he describes it, says: "I open the book, I raise the window, I tear the paper, I sit down," etc. Then the class is told to open the book, to raise the window, to tear the paper, to sit down, etc., to show their understanding of the English sentence. A further step is to have them tell, in full (English) statements, what they do. Afterwards the application of these words should be extended by such requests as: "Open the door; open the window; open the desk;" etc.; "Raise the slate; raise the chair;" etc., the pupil describing in English what he is doing.

7. The use of the simple pronouns, 'he, we, hers, they,' etc., should be taught through simple language lessons, *e.g.*: 'his slate; my book; he cleans the board; you hold the box; they close the door,' etc.

8. In a somewhat similiar way the simple prepositions may be taught, *e.g.*: "The book is *on* the chair; *under* the desk; *beside* the slate," etc.—the objects being placed in such positions.

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9. When some little advance has been made, the question and the negative forms should be used; also the plural and the possessive forms, the simple past tense and the common auxiliaries. These should not be taught from a book, or by rules, but should come from proper questioning, *e.g.*, "Tell me what he does. (He *writes* on his slate.) What is he doing? (He *is writing*, etc.) What did he do? (He *wrote*, etc.) What has he done? (He *has written*, etc.)"

10. Pupils should learn by heart such lists as the days of the week, the months, the numbers (as their arithmetic progresses); also simple pieces in prose and verse, the meaning of which they understand. They should sing Kindergarten songs, performing the actions, etc.

11. After teaching things as wholes, take up their parts, *e.g.* knife—'handle, blade, spring,' etc.; chair —'back, legs, seat,' etc.

12. The spoken English and French words should be associated throughout the course, the teacher giving the word or sentence in one language, and the pupils in the other. The teacher should use English in communicating with the pupils, so far at least as the progress of the class will admit. All explanations or commands required to be given at first in French should afterwards be repeated in English.

13. These oral lessons should be taken with each class at least twice a day, starting with ten minutes for each lesson, and lengthening the time as the class progresses.

II. Written Work; Reading and Translation.

1. When considerable progress has been made in the oral work, the names of objects, the description of simple actions, etc., should be written on the board, after having been given orally, and the pupils taught to recognize them in that form. Then they should be copied by the pupils and afterwards read to the teacher. Great care should be taken to secure, from the first, large, legible writing as it makes word recognition more easy.

2. These blackboard exercises may be continued for some time before the pupil is required to read from a book. The teacher may use charts, made by himself of big sheets of strong paper, using crayon for writing the words in large hand. The lessons should contain the words and phrases already taught and some new ones, and should not be identical with the lessons in the primer.

3. If the teacher understands the phonic method he should use it after the pupil can recognize readily a fair number of written words.

4. But, even if the teacher is unacquainted with phonics, he may greatly facilitate the learning of a number of words by using the board to show their likeness in form, which will easily suggest their likeness in sound: *e.g.*, from '*book*' it will be easy to teach 'look, took, cook,' etc.; from '*chair*,' 'hair, fair, pair,' etc. Similarly he might point out simple changes in sound dependent upon changes in form, *e.g.*:

$\left.\begin{matrix}\text{pin,}\\ \text{pine,}\end{matrix}\right\}$ $\left.\begin{matrix}\text{hat,}\\ \text{hate,}\end{matrix}\right\}$ $\left.\begin{matrix}\text{not,}\\ \text{note,}\end{matrix}\right\}$ etc.

Also he should thoroughly drill on forms that might be confusing on account of their resemblance, *e.g.*:

$\left.\begin{matrix}\text{from,}\\ \text{form,}\end{matrix}\right\}$ $\left.\begin{matrix}\text{tool,}\\ \text{toil,}\end{matrix}\right\}$ $\left.\begin{matrix}\text{though,}\\ \text{through,}\\ \text{thought,}\end{matrix}\right\}$ etc.

These words need not be especially sought out but should be used as the lesson supplies or suggests them.

5. Before beginning reading from the book, take a series of objects or language lessons to make the pupils acquainted with the subjects of at least the earlier lessons. Knowing the written words from the board, and being familiar with the ideas, the pupils should find little difficulty in these first lessons, especially if the blackboard is freely used.

6. It is most important that, before the reading, the teacher should talk about the lesson, explaining, with the pupils' help, the meaning of each particular word or phrase that might present difficulty, putting the new words into other constructions, giving the phrases a different form or using them in more familiar sentences that those in the Reader, paying special attention to idioms, etc., endeavoring in every way to give pupils a clear understanding of the meaning and construction. So far as the advancement of the class will admit of it, all such explanation should be in English. If the meaning has to be

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given in French, it would be well to repeat it immediately afterwards in English so that the pupils may grasp it in this language also.

7. Where the Bi-lingual series are used, the French lesson may be taken first, as presenting fewer difficulties.

8. After the reading exercise, the substance of each lesson should be given in the best English the pupil can command. It should be in a connected form, with but few questions from the teacher. Pupils may be encouraged to suggest other words or phrases that would be more suitable than those first given, or the teacher may supply them; such corrections should be employed in several different sentences till the pupils know their use.

9. To the third form inclusive, the pupils should copy every English lesson, and the teacher should test their knowledge of such written work.

10. The teacher should write on the board lists of English words or phrases, previously taught, followed by their French equivalents in parallel columns, to be copied and learned by heart. As a test, the English or the French column may be erased, to be supplied by the pupils on their slates or exercise books.

11. There should be English dictation every day, at first of such words as were written on the board and learned by the class. The teacher should write the hard words on the board, directing particular attention to the difficulties each presents, (silent letters, etc.) and have them copied on slates by the class. Then erase them from the board and slates and give in dictation. Afterwards phrases or sentences containing these words may be dictated.

12. All errors in such exercises should be written several times in the correct form, and a list of those words most commonly missed, should be kept in review form.

13. Each day the class should learn by heart a portion of the reading lesson, or of certain chosen lessons, or of other selections written on the board. The meaning of each should be made clear to the pupils before being committed to memory.

14. As the class advances teach the written English forms of the plural, the possessive, the masculine and feminine, the past tense, etc.

15. Sentences that the pupils have given in English describing actions, pictures, etc., should be written on the board and, with the help of the class, the translation, of each word put underneath it. In such sentences the order of the words should at first be the same in the two languages. Erase the sentences from the board, dictate the French, and have pupils write on their slates the corresponding English from memory. Sentences wherein the order of the words differs in the two languages, should come only after the pupil has had considerable practice.

16. With each reading lesson, whether French or English, there should be considerable oral translation, at first of the easier words and phrases, but gradually increasing in difficulty as the pupil advances, until the whole lesson can be so rendered. In such exercises from the Bi-lingual series, either one side of the open book should be covered, or else the book be closed. If they convey the right meaning, the pupils' own expressions should be preferred to those of the book. Frequently the teacher should give for translation sentences changed somewhat from those in the lesson though consisting for the most part of the same words, especially for the junior classes.

17. For the young pupils the translation should be as literal as possible so that they will have some *definite* meaning for each word. After considerable practice they may be taught to give a variety of expressions or forms, while preserving the meaning; and the English idoms may be introduced *gradually*.

18. Translation should not be confined to the reading lessons, but should include arithmetic, geography, history and all school studies.

19. The reproduction of interesting stories will be of great service. If the teacher reads the story in French let the class relate the substance of it in English; if given in English let the pupils tell it in French first and afterwards in English. This reproduction should be oral at first so that all mistakes may be corrected; afterwards it should be written if the pupil is able.

20. The use of a dictionary for assisting in translation should be explained in the senior second form, or earlier if the pupils can profit by it. They require instruction how to choose the proper word and how to tell the pronunciation. Each school should have a standard English dictionary, (the Concise Imperial is good,) and a large French-English

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dictionary, as the smaller books commonly used by the pupils are not always reliable or sufficiently complete.

21. Regular written translation should begin at latest in the junior second form and should receive very careful attention in all classes. The first exercises should be short and simple. They may be taken from the Reader or may be suitable selections from other books. In the latter case they should be written on the board or dictated to the class. Especially in the early lessons it is very advisable to make free use of the board to shew the correct form and to simplify all difficulties. Every written exercise should be carefully examined, and be written again if many mistakes are found. There should be at least two such exercises in written translation each day.

Where the Bi-lingual series are used the teacher should supply himself with other material suitable for translation.

Text Books for French-English Schools.

English.

Public School Arithmetic. Forms III to V..........................25c.
Public School Geography. Forms III senr. to V.....................75c.
Public School Grammar. Forms IV V.................................25c.
Public School History. Forms IV-V.................................30c.
French-English Readers. (For Public Schools.)
Canadian Catholic Readers. (For Separate Schools.)

French.

Grammaire Ire Année. Larousse. Forms III to V.....................35c.
French-English Readers. (For Public Schools.)
Montpelit Readers. (For Separate Schools.)

Toronto, August, 1900.

BI-LINGUAL SCHOOLS.

Circular to Public and Separate School Inspectors.

Gentlemen,—You will kindly bring to the attention of the teachers in your Inspectorates, the special needs of the French Bi-Lingual Schools.

For several years efforts have been made by the Education Department to improve the condition of the schools in parts of the Province where French is the language generally spoken by the members of the community. It is well known that there was a strong desire manifested by parents whose native language is French, to give their children a fair knowledge of the English language, which is yearly becoming more important from a commercial and national point of view. The establishment, some years ago of an English French Training School at Plantagenet, did much towards improving the condition of the schools in the eastern part of Ontario. Advancement, has not, however, been as rapid as would be desirable, owing to the difficulty of securing teachers who have the necessary knowledge of both the English and French languages. It is evident the pupils of the schools will receive better training if higher academic and professional attainments are required of the teachers.

Qualifications of Teachers.

Thus far it has been found necessary to combine the academic and professional training of the teachers, but the time has now come when it is desirable to separate these two parts of a teacher's qualifications, as has long been the case in the training of English speaking teachers. With this object in view, persons seeking to qualify for teachers of Bi-Lingual Schools, on and after September, 1900, will confine their attention during the academic year, ending in June, to the non-professional requirements which may be

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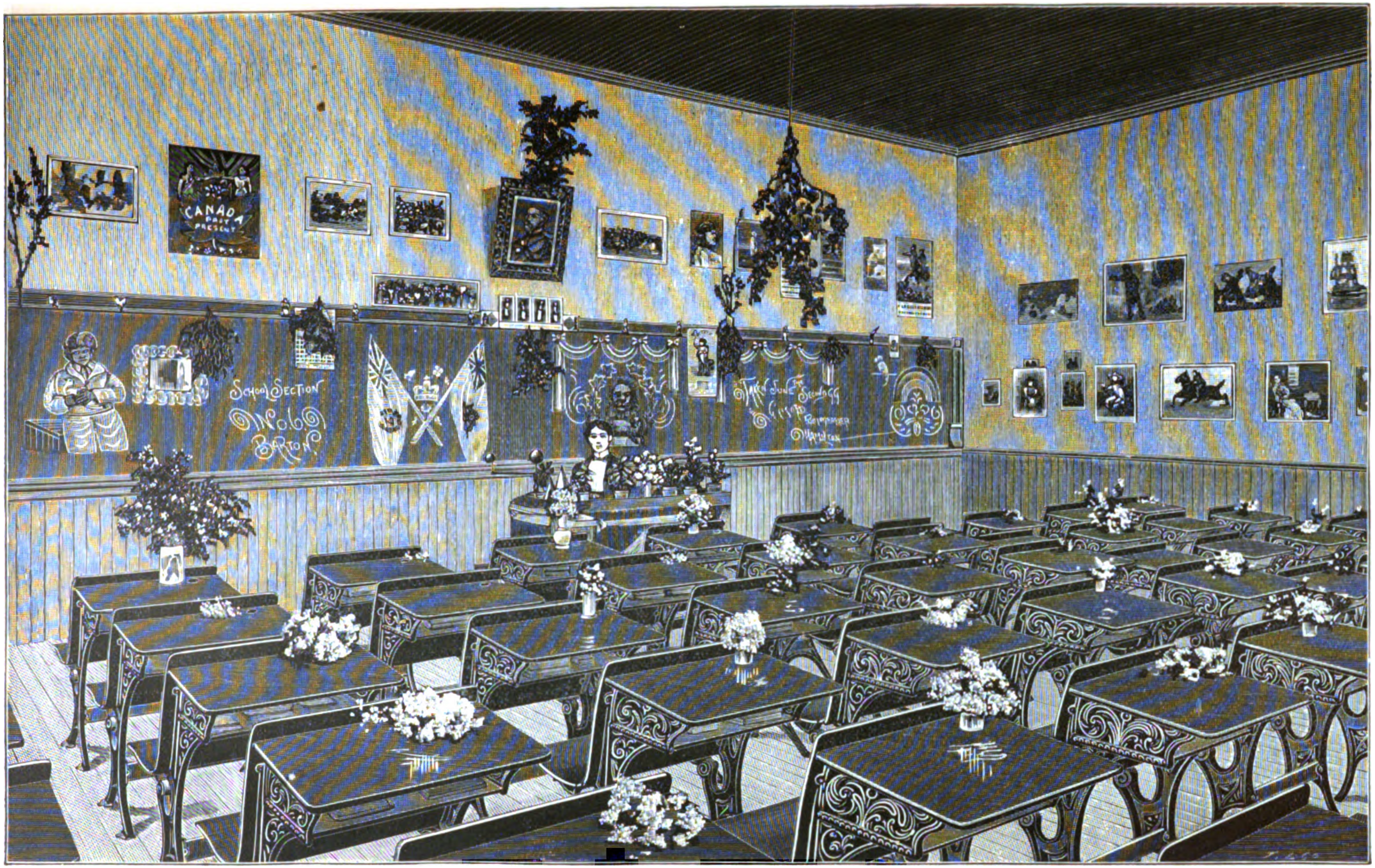

Decoration on "Empire Day" at No. 6, Township of Barton

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UNIV. OF MICH.

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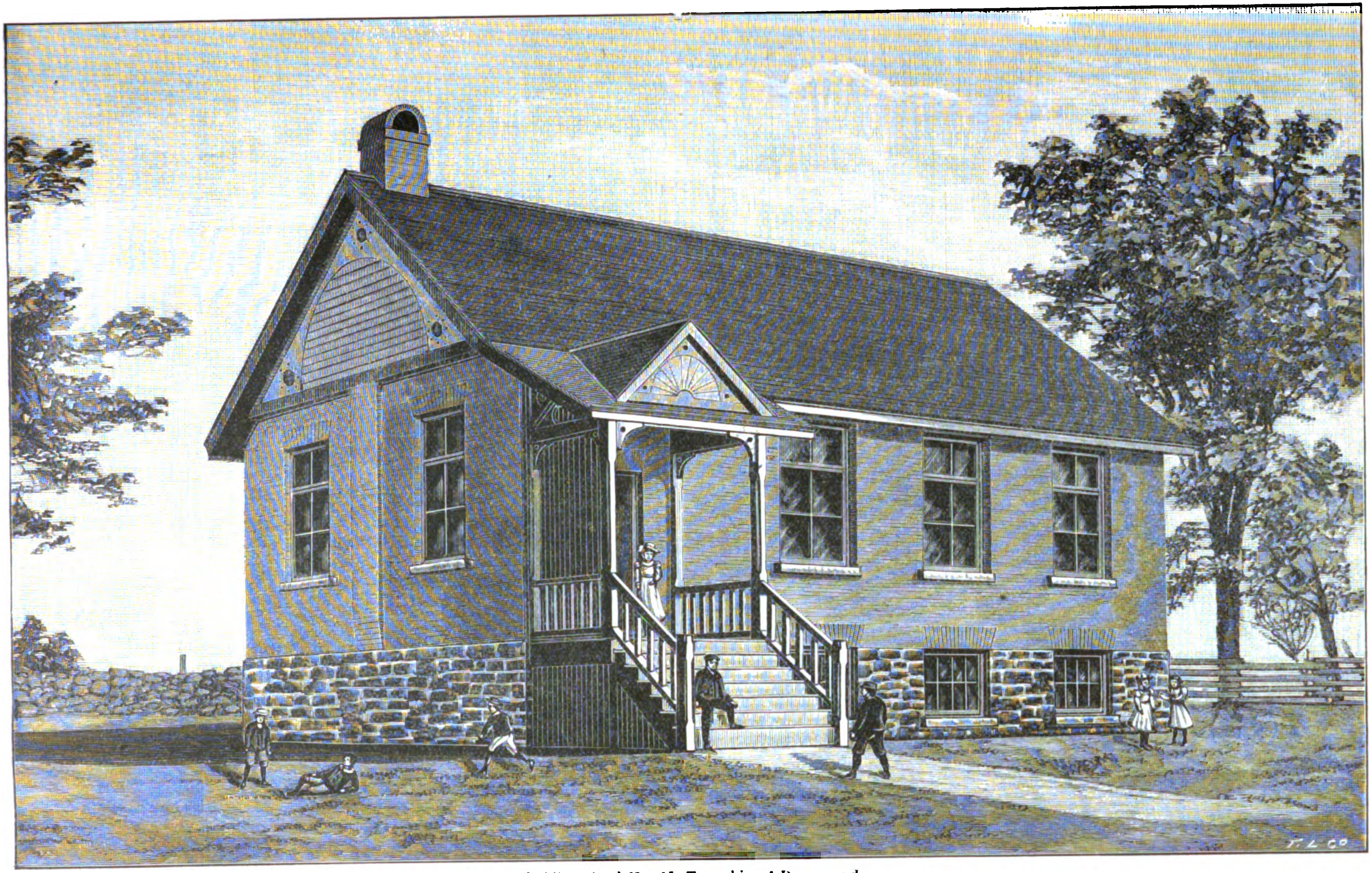

Public School No. 15, Township of Drummond.

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taken at Plantagenet, or elsewhere. The examination will be on the same papers (the standard to be hereafter determined) as those prescribed for the Public School Leaving (Part I., Junior Leaving) examination together with question papers in French Grammar and French Composition. The candidates who pass this examination will be required to undertake subsequently, from September to December, a course of professional training, somewhat on the same lines as that now exacted of candidates for Provincial Third Class Certificates. This course is to be taken in Ottawa and arrangements made by which the candidates may have some of the advantages of the Normal School. It is also intended to have certificates obtained in this way, valid for any school in the Province where the Inspector may certify that a French Bi-Lingual teacher is required. The duration of such certificates will be three years, renewals under certain conditions to be granted on the recommendation of the Inspector. It is to be understood that these provisions will not affect the rights of teachers who have already obtained certificates under the present regulations.

Methods of Teaching.

Teachers of French Bi-Lingual Schools should make it a special duty to render the pupils acquainted with the English language, and in ungraded schools should, therefore, devote about two hours daily to the teaching of English—reading, spelling, composition, oral English, &c. In graded schools each teacher should give, at least one hour daily—the time to be increased at the request of the Inspector. The regulation requiring that so far as possible, all communication between pupil and teacher shall be in English, must be carefully observed. There should be little teaching of English from books until the pupils have gained a fair knowledge of oral English. To this end the teachers should follow the instructions in the circular prepared by the Education Department on the teaching of English.

Toronto, August 1st, 1900.

CIRCULAR FOR LIBRARIANS ON CLASSIFICATION OF BOOKS IN PUBLIC LIBRARIES.

In 1895 a departmental Catalogue was published to assist Librarians in the classification of Books in Public Libraries. As explained in the preface it was not considered advisable to change the principal headings, or subjects, which have been in use in Mechanics' Institutes for over 25 years, viz.,—History; Biography; Voyages; Adventure and Travel; Science and Art; General Literature; Poetry and the Drama, Religious Literature; Fiction; Miscellaneous Books; Reference Books.

Under these headings, or subjects, all Libraries receiving a share of the Legislative Grant are required to send Annual Reports of Books purchased, loaned, etc., to the Education Department.

In order to guide Librarians the following synopsis of classification, with principal and sub-headings from the departmental Catalogue (out of print) is now issued, with the request that Librarians of all Public Libraries receiving Government aid will conform to the regulations of this Department, so that we may have an uniform classification.

HISTORY.

I. Ancient History.

1. History of Egypt, Persia, etc., (including Historical Romances) Archaeology and Mythology.
2. History of Rome (including Historical Romances).
3. History of Greece (including Historical Romances).

II. Mediæval History.

History of the Crusades, (including Historical Romances).

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III. Modern History.

A. *Europe.*

1. History of the World, Europe, etc., (including Historical Romances).
2. History of Great Britain and Ireland (including Historical Romances).
3. History of France (including Historical Romances).
4. History of Germany, Austria and Hungary, (including Historical Romances).
5. History of Holland, Denmark, Sweden and Norway, (including Historical Romances).
6. History of Italy, Switzerland, etc., (including Historical Romances).
7. History of Spain, Portugal, etc., (including Historical Romances).
8. History of Russia, Poland and Turkey, (including Historical Romances).

B. *Asia.*

1. History of China, Japan, and Sandwich Islands.
2. History of India, (including Historical Romances).
3. Miscellaneous Asiatic History, (including Historical Romances).

C. *Africa.*

History of Africa, (including Historical Romances).

D. *America.*

1. History of North and South America, (including Historical Romances).
2. History of British North America, New France, etc., (including Historical Romances).

E. *Australia.*

History of Australia, New Zealand, etc., (including Historical Romances)

IV. Miscellaneous Historical Books.

1. Great Battles, Sieges, etc., (Ancient and Modern).
2. Historical Tales.

BIOGRAPHY.

I. Individual Biographies.

1. English, Scottish, and Irish.
2. English, Scottish, and Irish, (published in series).
3. French, German, Italian, Spanish, etc.
4. French, German. etc., (published in series).
5. American, (Canada and the United States).
6. American, (published in series).
7. Miscellaneous Individual Biography, (published in series)

II. Collective Biography.

1. Classical.
2. Historical Characters.
3. Literary and Scientific Men and Women.
4. Artists and Musicians.
5. Celebrated Men, Women and Children.

VOYAGES, ADVENTURE AND TRAVEL.

I. Voyages around the World.

Travel and Adventure round the World.

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II. Europe.

1. Travel and Adventure in Europe, (various countries).
2. Travel and Adventure in England, Scotland, and Ireland.
3. Travel and Adventure in France, Germany, Spain, etc.
4. Travel and Adventure in Italy, Greece, Russia, etc.

III. Asia.

1. Travel and Adventure in Egypt, Palestine, etc.
2. Travel and Adventure in China, India, Japan, etc.

IV. Africa.

Travel and Adventure in Africa, Madagascar, etc.

V. America.

Travel and Adventure in North and South America.

VI. Travel and Adventure in the Arctic Region, Whale Fishing, etc.

VII. Travel and Adventure in Australia, New Zealand, Pacific Ocean, etc.

VIII. The Ocean, Sea and Sailors.

IX. Miscellaneous Travel and Adventure (including Tales for Young People).

SCIENCE AND ART.

I. Natural Science.

(a) Anthropology, Ethnography, Ethnology, Biology, etc.
(b) Zoology—Mammalia, Birds, Reptiles, Fishes, etc.
(c) Entomology.
(d) Botany.
(e) Geology and Mineralogy.
(f) Natural Phenomena, Meteorology, etc.
(g) Astronomy.
(h) Chemistry.
(i) Physics—Mechanics, Heat, Light, Sound, etc.

II. Useful Arts.

A. Agriculture.

1. The Farm, Forests, Manures, etc.
2. Gardening, Fruit, Vegetables, etc.
3. Horses—Breeding, Training, Riding, etc.
4. Cattle, Sheep and Pigs.
5. The Dairy, Poultry, Pigeons and Bees.
6. Dogs, Rabbits and Domestic Pets.

(b) Electric Arts, Steam, etc
(c) Microscope, Telescope, Phonography, etc.
(d) Architecture and Engineering.
(e) Carpentry, Painting and other Trades.
(f) Miscellaneous Science and Manufactures for Young People and Amateurs.
(g) General Science, Discoveries, Inventions, etc.

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III. Fine Arts.

1. Drawing, Painting, Sculpture, Engraving, Heraldry, etc.
2. Music.

IV. Domestic Arts.

1. Physiology, Medicine, Hygiene, etc.
2. Home Life, Domestic Science, Sanitation, etc.
3. Amusements, Sports and Pastimes and Physical Culture.

V. English Language, Art of Teaching, etc.

1. English Language.
2. Art of Teaching.
3. International Education Series.
4. Education in Europe, America, etc.
9. Universities, etc.

GENERAL LITERATURE.

1. Ancient Literature.
2. English, Irish and Scottish Literature.
3. American Literature.
4. European and Foreign Literature.
5. Authors and Authorship.
6. Law and Constitutional History.
7. Political Economy and Sociology.
8. Mental, Moral and Political Science.
9. Moral Tales, Essays, Romances, etc.
10. Temperance Literature.
11. Juvenile Literature.

POETRY AND THE DRAMA.

1. English, Irish and Scottish Poets.
2. American Poetry—Canada and the United States.
3. Miscellaneous Poetry—Ancient and Modern.

RELIGIOUS LITERATURE.

1. Biblical History and Bible Lands—History of the Jews, etc.
2. Early Church History and Progress of Christianity.
3. Modern Church History.
4. The Reformation, Martyrs, etc.
5. Missionaries and Missions.
6. Religious Biography, Great Preachers, etc.
7. Natural Theology and Christian Ethics.
8. Religious Tales and Stories.
9. Non-Christian Religious Systems.

FICTION.

European and American Novels.

MISCELLANEOUS BOOKS.

1. Anecdotes and Short Stories.
2. Detective Stories.
3. Fairy Tales, Fables, etc.

REFERENCE BOOKS.

1. Dictionaries and Encyclopedias—Biblical, Classical, Biographical, English, etc.
2. Science and Art, Manufactures, etc.

Toronto, September, 1900.

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CIRCULAR TO PUBLIC LIBRARIES.

The following changes in the management of Public Libraries are authorized by the Act and Regulations of 1899.

1. Termination of Business Year.

The business year of the Public Libraries will in future close on 31st December, instead of 30th of April as formerly. Invoices not paid before the 1st day of January, will not be allowed for until the following year.

2. Annual Reports, etc.

Annual Reports with invoices and vouchers showing payment for Books, Magazines, and Newspapers, shall be sent to this Department not later than the 1st of February.

3. Annual Meeting.

Annual Meetings shall be held on the Second Monday in January in each year.

Suggestions for Discontinuation of Reading Rooms in Rural Districts.

This Department having been informed that Newspapers are very seldom read in some of the Reading Rooms, and that many Boards of Management have difficulty in paying expenses of Reading Rooms, purposes that after 31st of December, 1899, Libraries without Reading Rooms, may purchase Magazines, subject to the approval of the Department, payable out of the Legislative Grant for Libraries.

As Magazines contain the current literature of the day, it is recommended that they be circulated the same as books, and at the end of each year bound in volumes; one-half the cost of binding will be allowed out of the grant for the purchase of books.

DEPARTMENTAL REGULATIONS.

In rural districts where Library Boards cannot conform to the departmental regulation requiring Libraries to be open three times a week, on request of Boards of Management, the Minister will consent that such Libraries may be open either once or twice a week only, on the following conditions:

1. In Libraries open once a week only, the Legislative Grant shall not exceed $100.00
2. In Libraries open twice a week only, the Legislative Grant shall not exceed $150.00

Toronto, November, 1899.

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APPORTIONMENT OF THE LEGISLATIVE PUBLIC SCHOOL GRANT FOR 1900.

The apportionment of the Grant to the several municipalities is based upon the latest Returns of Population for the year 1899, and the division between the Public and Separate Schools on the average attendance of that year, as reported by the Inspectors, Public School Boards, and Separate School Trustees respectively.

While the Separate Schools will receive their portion of the Grant direct from the Department, that of the Public Schools will be paid, according to this Schedule, through the respective County, City, Town, and Village Treasurers.

Under the provisions of Section 12 of "An Act to improve the Laws respecting Public Schools," passed at the 1899 session of the Legislature, the Education Department is empowered "to appropriate out of moneys voted by the Legislature for Public and Separate Schools, a sum not exceeding $5.00 for every school in which the Regulations of the Department as to equipment, ventilation, heating, lighting, and the care of the premises generally have been complied with."

Each County Inspector is therefore authorized to deduct from the apportionment of each township such an amount as will provide the sum of $5.00 to be paid on his order to each Trustee Board that has complied with the requirements mentioned.

Toronto, May, 1900.

Public School Apportionment to Counties for 1899.

1. COUNTY OF BRANT.

Municipalities.	*Apportionment.*
Brantford	$626 00
Burford	530 00
Dumfries, South	326 00
Oakland	90 00
Onondaga	143 00
Total	$1,715 00

2. COUNTY OF BRUCE.

Albemarle	$179 00
Amabel	329 00
Arran	302 00
Brant	474 00
Bruce	374 00
Carrick	343 00
Culross	259 00
Eastnor	200 00
Elderslie	286 00
Greenock	274 00
Huron	390 00
Kincardine	480 00
Kinloss	293 00
Lindsay and St. Edmunds	88 00
Saugeen	179 00
Total	$4,450 00

3. COUNTY OF CARLETON.

Fitzroy	$318 00
Gloucester	495 00
Goulbourn	315 00
Gower, North	272 00
Huntley	275 00
March	98 00

3. COUNTY OF CARLETON.—*Con.*

Municipalities.	*Apportionment.*
Marlborough	195 00
Nepean	464 00
Osgoode	526 00
Torbolton	115 00
Total	$3,073 00

4. COUNTY OF DUFFERIN.

Amaranth	$317 00
Garafraxa, East	252 00
Luther, East	227 00
Melancthon	449 00
Mono	380 00
Mulmur	368 00
Total	$1,993 00

5. COUNTY OF ELGIN.

Aldborough	$526 00
Bayham	430 00
Dorchester, South	186 00
Dunwich	393 00
Malahide	451 00
Southwold	463 00
Yarmouth	605 00
Total	$3,054 00

6. COUNTY OF ESSEX.

Anderdon	$160 00
Colchester, North	155 00
" South	334 00
Gosfield, North	240 00

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Public School Apportionment to Counties

6. COUNTY OF ESSEX.—*Con.*

Municipalities.	*Apportionment.*
Gosfield, South	293 00
Maidstone	297 00
Malden	116 00
Mersea	468 00
Pelee Island	76 00
Rochester	285 00
Sandwich, East	208 00
" West	282 00
" South	210 00
Tilbury, North	309 00
" West	266 00
Total	$3,699 00

7. COUNTY OF FRONTENAC.

Barrie	$67 00
Bedford	180 00
Clarendon and Miller	48 00
Hinchinbrooke	168 00
Howe Island	
Kennebec	155 00
Kingston	284 00
Loughborough	170 00
Olden	112 00
Oso	125 00
Palmerston and Canonto	130 00
Pittsburg	260 00
Portland	254 00
Storrington	231 00
Wolfe Island	186 00
Total	$2,320 00

8. COUNTY OF GREY.

Artemesia	$418 00
Bentinck	413 00
Collingwood	447 00
Derby	243 00
Egremont	400 00
Euphrasia	389 00
Glenelg	288 00
Holland	416 00
Keppel	417 00
Normanby	517 00
Osprey	405 00
Proton	348 00
Sarawak	167 00
St. Vincent	352 00
Sullivan	441 00
Sydenham	414 00
Total	$6,075 00

9. COUNTY OF HALDIMAND.

Canborough	$122 00
Cayuga, North	198 00
" South	101 00
Dunn	111 00
Moulton	216 00
Oneida	188 00
Rainham	203 00
Seneca	244 00
Sherbrooke	50 00
Walpole	385 00
Total	$1,818 00

10. COUNTY OF HALIBURTON.

Municipalities.	*Apportionment.*
Anson and Hindon	$33 00
Cardiff	71 00
Dudley, Dysart, Harcourt, Harburn, Guilford	123 00
Glamorgan	64 00
Livingstone	5 00
Lutterworth	55 00
McClintock	7 00
Minden	150 00
Monmouth	64 00
Nightingale	1 00
Sherbourne	17 00
Snowdon	98 00
Stanhope	50 00
Total	$738 00

11. COUNTY OF HALTON.

Esquesing	$460 00
Nassagaweya	294 00
Nelson	347 00
Trafalgar	466 00
Total	$1,567 00

12. COUNTY OF HASTINGS.

Carlow	$77 00
Dungannon	90 00
Elzevir and Grimsthorpe	161 00
Faraday	212 00
Hungerford	406 00
Huntingdon	310 00
McClure, Wicklow and Bangor	111 00
Herschel and Monteagle	218 00
Madoc	325 00
Marmora and Lake	280 00
Mayo	67 00
Rawdon	399 00
Sidney	496 00
Thurlow	577 00
Tudor and Cashel	109 00
Limerick	58 00
Wollaston	90 00
Tyendinaga	386 00
Total	$4,367 00

13. COUNTY OF HURON.

Ashfield	$346 00
Colborne	209 00
Goderich	306 00
Grey	398 00
Hay	381 00
Howick	475 00
Hullet	318 00
McKillop	311 00
Morris	325 00
Stanley	278 00
Stephen	460 00
Tuckersmith	300 00
Turnberry	
Usborne	294 00
Wawanosh, East	233 00
" West	246 00
Total	$5,152 00

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Public School Apportionment to Counties.

14. COUNTY OF KENT.

Municipalities.	*Apportionment.*
Camden	$307 00
Chatham	692 00
Dover	510 00
Harwich	527 00
Howard	434 00
Orford	321 00
Raleigh	476 00
Romney	207 00
Tilbury, East	405 00
Zone	159 00
Total	$4,038 00

15. COUNTY OF LAMBTON.

Bosanquet	$310 00
Brooke	402 00
Dawn	425 00
Enniskillen	623 00
Euphemia	271 00
Moore	586 00
Plympton	418 00
Sarnia	264 00
Sombra	402 00
Warwick	338 00
Total	$4,039 00

16. COUNTY OF LANARK.

Bathurst	$287 00
Beckwith	207 00
Burgess, North	47 00
Dalhousie and Sherbrooke, North	219 00
Darling	88 00
Drummond	228 00
Elmsley, North	130 00
Lanark	212 00
Lavant	64 00
Montague	228 00
Pakenham	200 00
Ramsay	264 00
Sherbrooke, South	108 00
Total	$2,282 00

17. COUNTY OF LEEDS.

Bastard and Burgess, South	$343 00
Crosby, North	189 00
" South	206 00
Elizabethtown	373 00
Elmsley, South	105 00
Kitley	237 00
Leeds and Lansdowne, Front	333 00
" " Rear	270 00
Yonge and Escott, Rear	136 00
Yonge, Front and Escott	305 00
Total	$2,447 00

17 (*a*). COUNTY OF GRENVILLE.

Augusta	$437 00
Edwardsburg	449 00
Gower, South	100 00
Oxford, Rideau	325 00
Wolford	225 00
Total	$1,536 00

18. COUNTY OF LENNOX AND ADDINGTON.

Municipalities.	*Apportionment.*
Adolphustown	$50 00
Amherst Island	106 00
Anglesea, Effingham and Kaladar	143 00
Camden, East	644 00
Denbigh, Abinger and Ashley	135 00
Ernesttown	412 00
Fredericksburg, North	182 00
" South	130 00
Richmond	259 00
Sheffield	223 00
Total	$2,283 00

19. COUNTY OF LINCOLN.

Caistor	$230 00
Clinton	238 00
Gainsborough	279 00
Grantham	222 00
Grimsby, North	137 00
" South	173 00
Louth	202 00
Niagara	215 00
Total	$1,696 00

20. COUNTY OF MIDDLESEX.

Adelaide	$264 00
Biddulph	251 00
Caradoc	484 00
Delaware	192 00
Dorchester, North	434 00
Ekfrid	332 00
Lobo	337 00
London	1,073 00
McGillivray	352 00
Metcalfe	193 00
Mosa	327 00
Nissouri, West	324 00
Westminster	487 00
Williams, East	186 00
" West	160 00
Total	$5,396 00

21. COUNTY OF NORFOLK.

Charlotteville	$417 00
Houghton	252 00
Middleton	331 00
Townsend	487 00
Walsingham, North	270 00
" South	219 00
Windham	432 00
Woodhouse	246 00
Total	$2,654 00

22. COUNTY OF NORTHUMBERLAND.

Alnwick	$140 00
Brighton	311 00
Cramahe	321 00
Haldimand	449 00
Hamilton	475 00
Monaghan, South	104 00
Murray	353 00
Percy	355 00
Seymour	344 00
Total	$2,852 00

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Public School Apportionment to Counties.

22 (a). COUNTY OF DURHAM.

Municipalities.	*Apportionment.*
Cartwright	$218 00
Cavan	314 00
Clarke	510 00
Darlington	522 00
Hope	412 00
Manvers	376 00
Total	$2,352 00

23. COUNTY OF ONTARIO.

Brock	$450 00
Mara	293 00
Pickering	666 00
Rama	163 00
Reach	447 00
Scott	273 00
Scugog Island	61 00
Thorah	167 00
Uxbridge	331 00
Whitby, East	330 00
Whitby	259 00
Total	$3,440 00

24. COUNTY OF OXFORD.

Blandford	$199 00
Blenheim	571 00
Dereham	442 00
Nissouri, East	319 00
Norwich, North	274 00
" South	292 00
Oxford, North	161 00
" East	297 00
" West	251 00
Zorra, East	490 00
" West	322 00
Total	$3,618 00

25. COUNTY OF PEEL.

Albion	$332 00
Caledon	465 00
Chinguacousy	492 00
Gore of Toronto	109 00
Toronto	618 00
Total	$2,016 00

26. COUNTY OF PERTH.

Blanchard	$328 00
Downie	306 00
Easthope, North	272 00
" South	237 00
Ellice	377 00
Elma	446 00
Fullarton	277 00
Hibbert	248 00
Logan	358 00
Mornington	346 00
Wallace	347 00
Total	$3,542 00

27. COUNTY OF PETERBOROUGH.

Anstruther	$ 30 00
Asphodel	208 00
Belmont	208 00
Burleigh	52 00
Cavendish	18 00
Chandos	99 00
Douro	251 00

27. COUNTY OF PETERBOROUGH.—*Con.*

Municipalities.	*Apportionment.*
Dummer	$248 00
Ennismore	99 00
Galway	111 00
Harvey	122 00
Methuen	29 00
Monaghan, North	136 00
Otonabee	409 00
Smith	340 00
Total	$2,360 00

28. COUNTY OF PRESCOTT.

Alfred	$ 37 00
Caledonia	136 00
Hawkesbury, East	312 00
" West	324 00
Longueuil	64 00
Plantagenet, North	358 00
" South	224 00
Total	$1,455 00

28 (a). COUNTY OF RUSSELL.

Cambridge	$165 00
Clarence	152 00
Cumberland	314 00
Russell	200 00
Total	$831 00

29. COUNTY OF PRINCE EDWARD.

Ameliasburg	$372 00
Athol	139 00
Hallowell	351 00
Hillier	194 00
Marysburg, North	137 00
" South	163 00
Sophiasburg	231 00
Total	$1,587 00

30. COUNTY OF RENFREW.

Admaston	$262 00
Algona, South	109 00
Alice and Fraser	230 00
Bagot and Blythfield	169 00
Brougham	59 00
Bromley	198 00
Brudenell and Lyendoch	169 00
Grattan	231 00
Griffith and Matawatchan	63 00
Hagarty, Jones, Sherwood, Richards and Burns	323 00
Head, Clara and Maria	60 00
Horton	178 00
McNab	426 00
Pembroke	80 00
Petawawa	39 00
Radcliffe and Raglan	127 00
Rolph, Wylie, McKay, Buchanan	136 00
Ross	344 00
Sebastopol	89 00
Stafford	112 00
Westmeath	423 00
Wilberforce and Algona, North	268 00
Total	$4,095 00

31. COUNTY OF SIMCOE.

Adjala	$325 00
Essa	496 00
Flos	407 00

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Public School Apportionment to Counties.

31. COUNTY OF SIMCOE.—*Continued.*

Municipalities.	*Apportionment.*
Gwillimbury, West	$290 00
Innisfil	473 00
Matchedash	61 00
Medonte	493 00
Nottawasaga	663 00
Orillia	445 00
Oro	489 00
Sunnidale	272 00
Tay	517 00
Tiny	364 00
Tecumseth	417 00
Tossorontio	219 00
Vespra	361 00
Total	$6,192 00

32. COUNTY OF STORMONT.

Cornwall	$559 00
Finch	339 00
Osnabruck	579 00
Roxborough	310 00
Total	$1,787 00

32 (*a*). COUNTY OF DUNDAS.

Matilda	$458 00
Mountain	407 00
Williamsburg	455 00
Winchester	375 00
Total	$1,695 00

32 (*b*) COUNTY OF GLENGARRY.

Charlottenburg	$519 00
Kenyon	480 00
Lancaster	415 00
Lochiel	473 00
Total	$1,887 00

33. COUNTY OF VICTORIA.

Bexley	$102 00
Carden	88 00
Dalton	61 00
Eldon	336 00
Emily	248 00
Fenelon	301 00
Laxton, Digby and Longford	94 00
Mariposa	478 00
Ops	278 00
Somerville	231 00
Verulam	221 00
Total	$2,438 00

34. COUNTY OF WATERLOO.

Dumfries, North	$263 00
Waterloo	805 00
Wellesley	479 00
Wilmot	593 00
Woolwich	521 00
Total	$2,661 00

35. COUNTY OF WELLAND.

Municipalities.	*Apportionment.*
Bertie	$369 00
Crowland	129 00
Humberstone	349 00
Pelham	294 00
Stamford	238 00
Thorold	214 00
Wainfleet	321 00
Willoughby	121 00
Total	$2,035 00

36. COUNTY OF WELLINGTON.

Arthur	$301 00
Eramosa	319 00
Erin	428 00
Garafraxa, West	326 00
Guelph	285 00
Luther, West	256 00
Maryborough	367 00
Minto	373 00
Nichol	183 00
Peel	450 00
Pilkington	179 00
Puslinch	425 00
Total	$3,892 00

37. COUNTY OF WENTWORTH.

Ancaster	$462 00
Barton	439 00
Beverly	499 00
Binbrook	202 00
Flamborough, East	299 00
" West	344 00
Glanford	190 00
Saltfleet	373 00
Total	$2,808 00

38. COUNTY OF YORK.

Etobicoke	$412 00
Georgina	202 00
Gwillimbury, East	416 00
" North	170 00
King	635 00
Markham	636 00
Scarborough	463 00
Vaughan	536 00
Whitchurch	458 00
York	967 00
Total	$4,895 00

39. DISTRICTS.

Algoma Muskoka Nipissing Parry Sound	Including rural separate schools but not schools in towns and villages named in this list.	$35,000 00
Total		$35,000 00

Apportionment to Roman Catholic Separate Schools for 1900, Payable Through this Department.

School Sections.		Apportionment.
Adjala	10	$23 00
Alfred	3	23 00
"	6	26 00
" ... 7 (with 8, Plantagenet, South)		12 00
"	7	29 00
"	8	33 00
"	9	27 00
"	10	73 00
"	11	10 00
"	12	26 00
"	13	28 00
"	14	21 00
"	15	24 00
Admaston	4	21 00
Anderdon	2, 5 and 8	27 00
"	3 and 4	15 00
Arthur	6	40 00
"	10	31 00
Ashfield	2	57 00
Asphodel	4	17 00
Augusta	15	20 00
Balfour ... 1 (District of Algoma)		.....
Biddulph	6	23 00
" ... 9 (with 1 McGillivray)		10 00
Bonfield..1A, 1B, 2, 4 District of Nipissing		.....
Brant (with 3 Greenock)	2	8 00
Brighton	1 (15)	11 00
Bromley	4	23 00
"	6	22 00
"	7 to be app't'd.	
Brougham	1	12 00
Burgess, North	2	30 00
"	4	18 00
"	6	12 00
Caledonia	3, 4 and 10	17 00
" .... 6 (with 7 Plantagenet, S.)		11 00
"	12	39 00
"	13 to be app't'd.	
Cambridge	3	25 00
"	4	23 00
"	5	30 00
"	6	32 00
"	6 and 7	40 00
Carrick	1	37 00
" (with 1 Culross)	1	69 00
"	2	18 00
" (with 2 Culross)	2	18 00
"	4	21 00
"	14	98 00
Charlottenburg	15	32 00
"	16	27 00
Chisholm and Boulter (District of Nipissing)		.....
Clarence	5	85 00
"	6	52 00
"	8	40 00
"	11	29 00
"	12	22 00
"	13	17 00
"	14	31 00
"	16	17 00
"	17	19 00
"	19	17 00
"	20	19 00
"	21	28 00
Cornwall	1	18 00
"	16	50 00
Crosby, North	4	55 00
"	7	11 00
Culross (with 1 Carrick)	1	71 00
" (with 2 Carrick)	2	19 00
Cumberland	10	15 00
"	11	15 00
"	13	19 00
	14	36 00

School Sections.		Apportionment.
Downie	9	$35 00
Dover	3 to be app't'd.	
"	7 to be app't'd.	
Dunnett and Rutter, 1 (Dist. of Nipissing)		.....
Edwardsburg	2	12 00
Ellice	7	17 00
Ferris ... 3 (District of Nipissing)		.....
" ... 4 " "		.....
Finch	5	39 00
Flamborough, West	2	11 00
Greenock	3 (with 2 Brant)	55 00
Glenelg	5	18 00
"	7	27 00
Gloucester	1 (with 3 Osgoode)	12 00
"	4, 5 and 12	9 00
"	14	30 00
"	15	74 00
"	17	5 00
"	20	26 00
"	22	16 00
"	25	84 00
"	26	26 00
Griffith, etc.	3	8 00
Hagarty	4	24 00
Haldimand	2	24 00
"	14	16 00
"	21	8 00
Harwich	9	27 00
Hawkesbury, East	2	47 00
"	4	11 00
"	6	21 00
"	7	91 00
"	10	50 00
"	11	25 00
"	12	14 00
"	15	24 00
"	16	8 00
"	41	41 00
Hay	1	41 00
Hibbert	(1) 3	17 00
Howe Island	1	12 00
"	2	20 00
"	3	14 00
Holland, etc.	3	9 00
Hullett	2	13 00
Keewatin ... 1 (see District of Algoma)		.....
Kingston	8	16 00
Lancaster	14	31 00
Lochiel	12A	29 00
"	12B	49 00
Longueuil, West	2	17 00
"	4A	18 00
"	7	24 00
Loughboro'	2	16 00
"	10	20 00
Maidstone	1	44 00
" ... 4 (with 2 Rochester)		12 00
Malden	3A	27 50
"	3B	27 50
Mara	3	69 00
March	3	39 00
Marmora and Lake	1	6 00
Matawatchan	3	14 00
Moore	3, 4 and 5	12 00
Mornington	4	29 00
McGillivray	1 (with 9 Biddulph)	9 00
McKillop	1	19 00
Nepean	7	34 00
"	15	72 00
Nicol	1	30 00
Normanby	5	20 00
"	10	16 00
Osgoode	1	15 00
"	2 (15)	16 00

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APPORTIONMENT OF ROMAN CATHOLIC SEPARATE SCHOOLS FOR 1900, PAYABLE THROUGH THIS DEPARTMENT —*Continued*

School Sections.		*Apportionment.*
Osgoode	3 (with 1 Gloucester)	$15 00
Papineau	1 (see Dist. of Nipissing)	.....
"	2 " "	.....
"	2B " "	.....
Peel	8	3 00
"	12	17 00
Percy	5	8 00
"	12 (with 12 Seymour)	5 00
Plantagenet, North	4	22 00
" "	7	17 00
" "	8	24 00
" "	9	26 00
" "	12	14 00
" South	4	41 00
" "	7	38 00
" "	7 (with 6 Caledonia)	7 00
" "	8	10 00
" "	8 (with 7 Alfred)	22 00
Proton	6	16 00
Raleigh	4	11 00
"	5	26 00
"	6	18 00
Rayside	1 (District of Algoma)	.....
Richmond	10 and 17	15 00
Rochester	2 (with 4 Maidstone)	29 00
"	7 to be app't'd.	
Roxboro'	12	58 00
"	16	21 00
Russell	1	8 00
"	4	10 00
"	6	77 00
"	7	18 00
"	8	82 00
Sandwich, East	1	95 00
"	2	27 00
Sandwich, West	6 and 9	31 00
Seymour	12 (with 12 Percy)	7 00
Sheffield	5	$28 00
Sombra	5	27 00
Stafford	2	22 00
Stephen	6	40 00
Springer	1 (Dist. of Nipissing)	...
"	2 " "	.....
Sydenham	7	11 00
Tiny	2	110 00
Toronto Gore	6	16 00
Tyendinaga	18	15 00
"	20	19 00
"	24	22 00
"	28	8 00
"	30	17 00
Vespra	7	5 00
Waterloo	13	62 00
Wawanosh, West	1	22 00
Wellesley	5	20 00
"	9 and 10	26 00
"	11	74 00
"	12	7 00
Westminster	13	9 00
Widdifield	2 (Dist. of Nipissing)	.....
Williams, West	10	21 00
Wilmot	15½	63 00
Winchester	12 (with 1 Russell)	10 00
Windham	8	46 00
Wolfe Island	1	7 00
"	2	20 00
"	4	27 00
Woolwich	10	33 00
Yonge and Escott R.	4	13 00
York	1	35 00
		$5,339 00

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Apportionment to Cities, Towns and Villages for 1900.

Cities.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Belleville	981 00	271 00	1,252 00
Brantford	1,975 00	239 00	2,214 00
Chatham	918 00	182 00	1,100 00
Guelph	1,063 00	266 00	1,329 00
Hamilton	5,387 00	955 00	6,342 00
Kingston	1,790 00	509 00	2,299 00
London	4,214 00	569 00	4,783 00
Ottawa	3,421 00	3,590 00	7,011 00
St. Catharines	1,029 00	236 00	1,265 00
St. Thomas	1,225 00	130 00	1,355 00
Stratford	1,079 00	216 00	1,295 00
Toronto	20,669 00	3,056 00	23,725 00
Windsor	1,390 00	....	1,390 00
Total	45,141 00	10,219 00	55,360 00

Towns.	Public Schools.	Separate Schools.	Total.
Alliston	228 00	....	228 00
Almonte	281 00	103 00	384 00
Amherstburg	129 00	132 00	261 00
Arnprior	290 00	176 00	466 00
Aurora	188 00	....	188 00
Aylmer	267 00	....	267 00
Barrie	620 00	111 00	731 00
Berlin	912 00	233 00	1,145 00
Blenheim	207 00	....	207 00
Bothwell	112 00	....	112 00
Bowmanville	353 00	....	353 00
Bracebridge	275 00	....	275 00
Brampton	367 00	....	367 00
Brockville	834 00	255 00	1,089 00
Carleton Place	508 00	....	508 00
Clinton	318 00	....	318 00
Cobourg	379 00	142 00	521 00
Collingwood	669 00	....	669 00
Cornwall	328 00	448 00	776 00
Deseronto	444 00	....	444 00
Dresden	200 00	....	200 00
Dundas	283 00	100 00	383 00
Durham	158 00	....	158 00
Essex	176 00	....	176 00
Forest	206 00	....	206 00
Fort William (including arrears 1899, $212)	646 00	....	646 00
Galt	865 00	58 00	923 00
Gananoque	416 00	....	416 00
Goderich	442 00	54 00	496 00
Gore Bay	123 00	....	123 00
Gravenhurst	228 00	....	228 00
Harriston	216 00	....	216 00
Ingersoll	502 00	66 00	568 00
Kincardine	262 00	....	262 00
Leamington	372 00	....	372 00
Lindsay	612 00	193 00	805 00
Listowel	322 00	....	322 00
Little Current	80 00	....	80 00
Mattawa	66 00	144 00	210 00
Meaford	219 00	....	219 00
Midland	300 00	....	300 00
Mitchell	262 00	....	262 00
Milton	162 00	....	162 00
Mount Forest	269 00	....	269 00
Napanee	375 00	....	375 00
Newmarket	219 00	42 00	261 00
Niagara	168 00	....	168 00
Niagara Falls	337 00	81 00	418 00
North Bay	199 00	99 00	298 00
North Toronto	198 00	....	198 00
Oakville	187 00	20 00	207 00
Orangeville	495 00	....	495 00
Orillia	459 00	104 00	563 00
Oshawa	461 00	55 00	516 00
Owen Sound	960 00	72 00	1,032 00
Palmerston	223 00	....	223 00
Parkhill	145 00	34 00	179 00
Paris	361 00	42 00	403 00
Parry Sound	365 00	....	365 00
Preston	222 00	51 00	273 00
Pembroke	347 00	275 00	622 00
Penetanguishene	277 00	....	277 00
Perth	327 00	135 00	462 00
Peterborough	907 00	390 00	1,297 00
Petrolea	577 00	....	577 00
Picton	407 00	29 00	436 00
Port Arthur	219 00	78 00	297 00
Port Hope	532 00	....	532 00
Prescott	276 00	146 00	422 00
Rat Portage	606 00	192 00	798 00
Renfrew	226 00	155 00	381 00
Ridgetown	270 00	....	270 00
Sandwich	174 00	....	174 00
Sarnia	740 00	102 00	842 00
Sault Ste. Marie	329 00	73 00	402 00
Seaforth	296 00	....	296 00
Simcoe	351 00	....	351 00
Smith's Falls	580 00	....	580 00
Stayner	151 00	....	151 00
Sturgeon Falls	48 00	61 00	109 00
St. Mary's	373 00	46 00	419 00
Strathroy	377 00	....	377 00
Sudbury	107 00	90 00	197 00
Thessalon	61 00	....	61 00
Thornbury	86 00	....	86 00
Thorold	194 00	68 00	262 00
Tilsonburg	281 00	....	281 00
Toronto Junction	659 00	....	659 00
Trenton	343 00	164 00	507 00
Uxbridge	214 00	....	214 00
Vankleekhill	146 00	137 00	283 00
Walkerton	278 00	105 00	383 00
Walkerville	142 00	....	142 00
Wallaceburg	297 00	59 00	356 00
Waterloo	362 00	61 00	423 00
Welland	222 00	....	222 00
Whitby	248 00	32 00	280 00
Wiarton	252 00	....	252 00
Wingham	271 00	....	271 00
Woodstock	1,120 00	....	1,120 00
Totals	34,168 00	5,213 00	39,381 00

Incorporated Villages.	Public Schools.	Separate Schools.	Total.
Acton	174 00	....	174 00
Ailsa Craig	85 00	....	85 00
Alexandria	43 00	167 00	210 00
Alvinston	118 00	....	118 00
Arkona	60 00	....	60 00
Arthur	101 00	60 00	161 00
Athens	119 00	....	119 00
Ayr	105 00	....	105 00
Ashburnham	209 00	....	209 00
Bath	49 00	....	49 00
Bayfield	68 00	....	68 00
Beamsville	99 00	....	99 00
Beaverton	89 00	....	89 00
Beeton	94 00	....	94 00

Apportionment to Cities, Towns and Villages for 1900.

Incorporated Villages.—*Con.*	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Belle River	70 00	....	70 00
Blyth	115 00	....	115 00
Bobcaygeon	108 00	....	108 00
Bolton	79 00	....	79 00
Bradford	120 00	....	120 00
Bridgeburg	152 00	....	152 00
Brighton	177 00	....	177 00
Brussels	146 00	....	146 00
Burk's Falls	82 00	....	82 00
Burlington	159 00	....	159 00
Caledonia	116 00	....	116 00
Campbellford	285 00	....	285 00
Cannington	143 00	....	143 00
Cardinal	161 00	....	161 00
Casselman	21 00	95 00	116 00
Cayuga	137 00	....	137 00
Chesley	210 00	....	210 00
Chesterville	97 00	....	97 00
Chippawa	29 00	....	29 00
Clifford	78 00	....	78 00
Colborne	127 00	....	127 00
Creemore	75 00	....	75 00
Delhi	96 00	....	96 00
Drayton	100 00	....	100 00
Dundalk	94 00	....	94 00
Dunnville	234 00	....	234 00
Dutton	100 00	....	100 00
East Toronto	168 00	....	168 00
Eganville	63 00	65 00	128 00
Elmira	135 00	....	135 00
Elora	138 00	19 00	157 00
Embro	79 00	....	79 00
Erin	61 00	....	61 00
Exeter	224 00	....	224 00
Fenelon Falls	158 00	....	158 00
Fergus	185 00	11 00	196 00
Fort Erie	111 00	....	111 00
Garden Island	35 00	....	35 00
Georgetown	178 00	....	178 00
Glencoe	130 00	....	130 00
Grand Valley	92 00	....	92 00
Grimsby	105 00	....	105 00
Hagersville	119 00	....	119 00
Hastings	57 00	43 00	100 00
Hanover	143 00	....	143 00
Havelock	110 00	....	110 00
Hawkesbury	52 00	210 00	262 60
Hensall	106 00	....	106 00
Hespeler	310 00	....	310 00
Hintonburg	143 00	138 00	281 00
Holland Landing	50 00	....	50 00
Huntsville	153 00	....	153 00
Iroquois	157 00	....	157 00
Kemptville	176 00	....	176 00
Kingsville	158 00	....	158 00
Lakefield	143 00	....	143 00
Lanark	103 00	....	103 00
Lancaster	65 00	....	65 00
L'Orignal	115 00	33 00	148 00
London, West	241 00	....	241 00
Lucan	98 00	....	98 00
Lucknow	182 00	....	182 00
Madoc	152 00	....	152 00
Markdale	101 00	....	101 00

Incorporated Villages.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Markham	127 00	....	127 00
Maxville	83 00	....	83 00
Merrickville	109 00	....	109 00
Merritton	166 00	42 00	208 00
Millbrook	111 00	....	111 00
Milverton	75 00	....	75 00
Morrisburg	203 00	....	203 00
Newboro'	56 00	....	56 00
Newburg	79 00	....	79 00
Newbury	54 00	....	54 00
Newcastle	65 00	....	65 00
New Hamburg	142 00	....	142 00
Niagara Falls, South	165 00	....	165 00
Norwich	161 00	....	161 00
Norwood	135 00	....	135 00
Oil Springs	132 00	....	132 00
Omemee	66 00	....	66 00
Ottawa, East	132 00	....	132 00
Paisley	125 00	....	125 00
Point Edward	166 00	....	166 00
Portsmouth	48 00	34 00	82 00
Port Carling	33 00	....	33 00
Port Colborne	121 00	18 00	139 00
Port Dalhousie	88 00	27 00	115 00
Port Dover	142 00	....	142 00
Port Elgin	172 00	....	172 00
Port Perry	184 00	....	184 00
Port Rowan	74 00	....	74 00
Port Stanley	73 00	....	73 00
Richmond	44 00	....	44 00
Richmond Hill	80 00	....	80 00
Rockland	24 00	136 00	160 00
Shelburne	165 00	....	165 00
Southampton	205 00	....	205 00
Springfield	55 00	....	55 00
Stirling	97 00	....	97 00
Stouffville	154 00	....	154 00
Streetsville	74 00	....	74 00
Sundridge	44 00	....	44 00
Sutton	77 00	....	77 00
Sturgeon Point	40 00	....	40 00
Tara	89 00	....	89 00
Teeswater	112 00	....	112 00
Thamesville	106 00	....	106 00
Thedford	81 00	....	81 00
Tilbury	60 00	69 00	129 00
Tiverton	56 00	....	56 00
Tottenham	70 00	....	70 00
Tweed	96 00	29 00	125 00
Vienna	45 00	....	45 00
Wardsville	38 00	....	38 00
Waterdown	98 00	....	98 00
Waterford	138 00	....	138 00
Watford	156 00	....	156 00
Wellington	75 00	....	75 00
Weston	115 00	18 00	133 00
Winchester	130 00	....	130 00
Woodbridge	82 00	....	82 00
Woodville	66 00	....	66 00
Wyoming	106 00	....	106 00
Wroxeter	53 00	....	53 00
Total	15,638 00	1,214 00	16,852 00

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Summary of Apportionment for 1900.

COUNTIES.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
1. Brant	1,715 00	....	1,715 00
2. Bruce	4,450 00	414 00	4,864 00
3. Carleton	3,073 00	473 00	3,546 00
4. Dufferin	1,993 00	....	1,993 00
5. Elgin	3,054 00	....	3,054 00
6. Essex	3,699 00	335 00	4,034 00
7. Frontenac	2,320 00	152 00	2,472 00
8. Grey	6,075 00	117 00	6,192 00
9. Haldimand	1,818 00	....	1,818 00
10. Haliburton	738 00	....	738 00
11. Halton	1,567 00	....	1,567 00
12. Hastings	4,367 00	87 00	4,454 00
13. Huron	5,152 00	192 00	5,344 00
14. Kent	4,038 00	82 00	4,120 00
15. Lambton	4,039 00	39 00	4,078 00
16. Lanark	2,282 00	60 00	2,342 00
17. Leeds and Grenville	3,983 00	112 00	4,095 00
18. Lennox and Addington	2,283 00	43 00	2,326 00
19. Lincoln	1,696 00	....	1,696 00
20. Middlesex	5,396 00	72 00	5,468 00
21. Norfolk	2,654 00	46 00	2,700 00
22. Northumberland and Durham	5,204 00	79 00	5,283 00
23. Ontario	3,440 00	69 00	3,509 00
24. Oxford	3,618 00	....	3,618 00
25. Peel	2,016 00	16 00	2,032 00
26. Perth	3,542 00	98 00	3,640 00
27. Peterborough	2,360 00	17 00	2,377 00
28. Prescott and Russell	2,286 00	1,735 00	4,021 00
29. Prince Edward	1,587 00	....	1,587 00
30. Renfrew	4,095 00	146 00	4,241 00
31. Simcoe	6,192 00	138 00	6,330 00
32. Stormont, Dundas and Glengarry	5,369 00	364 00	5,733 00
33. Victoria	2,438 00	....	2,438 00
34. Waterloo	2,661 00	285 00	2,946 00
35. Welland	2,035 00	....	2,035 00
36. Wellington	3,892 00	122 00	4,014 00
37. Wentworth	2,808 00	11 00	2,819 00
38. York	4,895 00	35 00	4,930 00
Total	124,830 00	5,339 00	130,169 00
39. Districts			
(a) Algoma; (b) Muskoka; (c) Nipissing; (d) Parry Sound — Exclusive of the towns and villages which appear in the general list.	33,800 00	1,200 00	35,000 00
Total	33,800 00	1,200 00	35,000 00
GRAND TOTALS.			
Counties	124,830 00	5,339 00	130,169 00
Cities	45,141 00	10,219 00	55,360 00
Towns	34,168 00	5,213 00	39,381 00
Villages	15,638 00	1,214 00	16,852 00
Districts	33,800 00	1,200 00	35,000 00
Totals	253,577 00	23,185 00	276,762 00

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APPENDIX C.—*ONTARIO NORMAL COLLEGE, PROVINCIAL NORMAL AND MODEL SCHOOLS.*

I. ONTARIO NORMAL COLLEGE.

(1) *Staff of Ontario Normal College, 1900.*

J. A. McLellan, M. A., L L. D, Professor of Psychology and History of Education, Principal.

R. A. Thompson, B. A., Lecturer on School Management, Vice-Principal.

J. T. Crawford, B. A., Lecturer on Methods in Mathematics.

W. M. Logan, M. A, Lecturer on Methods in Classics.

F. F. Macpherson, B. A., Lecturer on Methods in Literature and Composition.

S. A. Morgan, B. A, B. Paed, Lecturer on Methods in English Grammar and Rhetoric.

A. Paterson, M. A., Lecturer on Methods in History and Geography.

E. S. Hogarth, B. A., Lecturer on Methods in Modern Languages.

J. B. Turner, B. A., Lecturer on Methods in Chemistry, Botany and Zoology.

J. Gill, B. A., Lecturer on Methods in Physics.

F. F. Macpherson, B. A., Lecturer on Reading and Elocution.

J. B. Turner, B. A., Lecturer on School Hygiene and Sanitation.

(2) *Students in Ontario Normal College, 1900.*

	Male	Female
Admitted, Session 1900-1	78	66

II. PROVINCIAL NORMAL AND MODEL SCHOOLS.

1. Toronto Normal School.

(1) *Staff of Toronto Normal School, 1900.*

Wm. Scott, B. A.	Principal.
W. H. Elliott, B. A.	Vice Principal.
A. C. Casselman	Drawing Master, and in Model School.
S. H. Preston	Music " "
Eugene Mason	French Teacher.

(2) *Students in Toronto Normal School, 1900.*

	Male.	Female.
Admitted, First Session	14	116
Admitted, Second Session	17	105
Total	31	221

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2. Ottawa Normal School.

(1) *Staff of Ottawa Normal School, 1900.*

John A. MacCabe, M. A., LL.D	Principal.
S. B. Sinclair, B.A.	Vice-Principal.
J. A. Dobbie	Drawing Master, and in Model School.
T. A. Brown	Music " "
J. Fleury	French Teacher.

(2) *Students in Ottawa Normal School, 1900.*

	Male.	Female.
Admitted, First Session	25	75
Admitted, Second Session	17	72
Total	42	147

3. London Normal School.

(1) *Staff of London Normal School, 1900.*

F. W. Merchant, M.A.	Principal.
John Dearness	Vice-Principal.
S. K. Davidson	Drawing Master.
Fred. L. Evans	Music Master.
E. F. R. Copeman	Physical Instructor.
Miss Agnes Mackenzie	Teacher of Kindergarten Principles.

(2) *Students in London Normal School, 1900.*

	Male.	Female.
Admitted, First Session	23	78
Admitted, Second Session	24	71
Total	47	149

4. Toronto Model School.

(1) *Staff of Toronto Model School, 1900.*

Angus McIntosh	Head Master Boys' Model School.
R. W. Murray	First Assistant "
Thomas M. Porter	Second " "
Miss Jeannie Wood	Third " "
" H. B. Mills, B. A.	Fourth " "
" Margaret T. Scott	Head Mistress Girls' Model School.
" May K. Caulfeild	First Assistant "
" M. Meehan	Second " "
" Alice Stuart	Third " "
" Sarah M. Ross	Fourth " "
" Mary E. Macintyre	Kindergarden Teacher.
" Ellen Cody	" Assistant.
Mrs. Jean Somers	Instructor in Calisthenics.
" L. H. Baldwin	" Domestic Science.
Arthur King	Drill Master.

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(2) *Number of pupils in 1900.*

Boys, 258	Girls, 256	Total, 514
Kindergarten		Total, 58

5. Ottawa Model School.

(1) *Staff of Ottawa Model School, 1900.*

Edwin D. Parlow	Head Master Boys' Model School.
J. H. Putman	First Assistant "
J. F. Sullivan	Second " "
Miss H. S. Williams, B.A	Third " "
" Adeline Shenick, B.A., B, Sc.	Head Mistress Girl's Model School.
" A. E. G. Wilson	First Assistant "
" M. E. Butterworth	Second " "
" Florence Hanington	Third " "
" Eliza Bolton	Kindergarten Teacher.
" J. Stocks	" Assistant.
" Elizabeth H. Keyes	Teacher of Physical Culture.

(2) *Number of pupils, 1900.*

Boys, 138	Girls, 128	Total, 266
Kindergarten		Total, 55

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APPENDIX D.—*INSPECTION OF SCHOOLS.*

I. List of Inspectors.

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1899.
			$ c.
M. J. Kelly, M.D., LL.B.	Brant; City of Brantford; Town of Paris	Brantford	978 00
W. S. Clendenning	Bruce, East; Towns of Walkerton, Wiarton; Villages of Chesley, Tara	Walkerton	1,356 25
Alexander Campbell	Bruce, West; Town of Kincardine; Villages of Lucknow, Paisley, Port Elgin, Southampton, Teeswater, Tiverton	Kincardine	1,885 00
Robert H. Cowley, B.A.	Carleton; Villages of Hintonburg, Ottawa East, Richmond	Ottawa	1,637 50
Nathaniel Gordon	Dufferin; Town of Orangeville; Villages of Grand Valley, Shelburne	Orangeville	1,100 00
Arthur Brown	Dundas; Villages of Chesterville, Iroquois, Morrisburg, Winchester	Morrisburg	1,040 00
W.E. Tilley, M.A., Ph.D	Durham; Towns of Bowmanville, Port Hope; Villages of Millbrook, Newcastle	Bowmanville	1,550 00
Welbern Atkin	Elgin; Town of Aylmer; Villages of Dutton, Port Stanley, Springfield, Vienna	St. Thomas	1,525 00
*D. Chenay	Essex, North (No. 1); Town of Sandwich; Village of Belle River	Sandwich	1,000 00
D. A. Maxwell, B.A., LL.B., Ph.D	Essex, South (No. 2); City of Windsor; Towns of Amherstburg, Essex, Leamington, Walkerville; Village of Kingsville	Windsor	1,100 00
Wm. Spankie, M.D.	Frontenac; Villages of Garden Island, Portsmouth	Kingston	1,520 00
Don'ld McDiarmid, M.D	Glengarry; Villages of Alexandria, Lancaster, Maxville	Maxville	840 00
Andrew Grier	Grey, East; Town of Thornbury	Thornbury	965 00
Thomas Gordon	Grey, West; Town of Owen Sound	Owen Sound	1,252 50
N. W. Campbell	Grey, South; Towns of Durham, Meaford; Villages of Dundalk, Markdale	Durham	1,262 00
Clarke Moses	Haldimand; Town of Dunnville; Villages of Caledonia, Cayuga, Hagersville	Caledonia	1,210 00
Sylvanus Phillips, B.A.	Haliburton and North East Muskoka, South Nipissing, East Parry Sound; Villages of Burk's Falls, Huntsville, Sundridge	Minden	1,526 00
J. S. Deacon	Halton; Towns of Milton, Oakville; Villages of Acton, Burlington, Georgetown	Milton	1,401 25
William Mackintosh	Hastings, North; Villages of Madoc, Stirling	Madoc	1,498 75
John Johnston	Hastings, South; City of Belleville; Towns of Deseronto, Trenton; Village of Tweed	Belleville	1,580 00
David Robb	Huron, East (N.); Towns of Clinton, Seaforth, Wingham; Villages of Blyth, Brussels, Wroxeter	Brussels	1,893 75
J. Elgin Tom	Huron, West (S.); Town of Goderich; Villages of Bayfield, Exeter, Hensall	Goderich	1,480 00
Rev. W. H. G. Colles	Kent, East; Towns of Blenheim, Bothwell, Ridgetown; Village of Thamesville	Chatham	1,050 00
Robert Park	Kent, West; Towns of Dresden, Wallaceburg; Village of Tilbury	Chatham	1,140 00
C. A. Barnes, M.A	Lambton, East (No. 1); Villages of Alvinston, Arkona, Thedford, Watford, Wyoming	London	1,270 00
John Brebner	Lambton, West (No. 2); Towns of Petrolea, Sarnia; Villages of Oil Springs, Point Edward	Sarnia	1,353 00
F. L. Michell, M.A	Lanark; Towns of Almonte, Carleton Place, Perth, Smith's Falls; Village of Lanark	Perth	1,800 00
Wm. Johnston, M.A., LL.B	Leeds and Grenville, No. 1; Town of Gananoque; Village of Newboro'	Athens	1,150 00
Robert Kinney, M.D.	Leeds and Grenville, No. 2; Village of Athens	Brockville	1,050 00
T. A. Craig	Leeds and Grenville, No. 3; Town of Prescott; Villages of Cardinal, Kemptville, Merrickville	Kempville	1,050 00
Frederick Burrows	Lennox and Addington; Town of Napanee; Villages of Bath, Newburgh	Napanee	1,385 00

* Appointed in 1900.

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List of Inspectors.

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1899.
			$ c.
J. B. Grey	Lincoln; City of St. Catharines; Town of Niagara; Villages of Beamsville, Grimsby, Merritton, Port Dalhousie	St. Catharines	1,230 00
*P. J. Thompson, B.A.	Middlesex, East; Village of Lucan	London	1,300 00
H. D. Johnson	Middlesex, West; Towns of Parkhill, Strathroy; Villages of Ailsa Craig, Glencoe, Newbury, Wardsville	Strathroy	1,230 00
J. J. Wadsworth, M.A., M.B	Norfolk; Town of Simcoe; Villages of Delhi, Port Dover, Port Rowan, Waterford	Simcoe	1,500 00
Albert Odell	Northumberland; Town of Cobourg; Villages of Brighton, Campbellford, Colborne, Hastings	Cobourg	1,550 00
James McBrien	Ontario, North; Town of Uxbridge; Villages of Beaverton, Cannington, Port Perry	Prince Albert	970 00
John Waugh, B.A., D. Paed	Ontario, South; Towns of Oshawa, Whitby	Whitby	960 00
William Carlyle	Oxford: Towns of Ingersoll, Tilsonburg, Woodstock; Villages of Embro, Norwich	Woodstock	1,280 00
Allan Embury	Peel; Town of Brampton; Villages of Bolton, Streetsville	Brampton	1,200 00
William Irwin, B.A	Perth; Towns of Listowel, Mitchell, St. Mary's; Village of Milverton	Stratford	1,597 50
J. C. Brown	Peterborough; Villages of Ashburnham, Havelock, Lakefield, Norwood	Peterborough	1,325 00
W. J. Summerby	Prescott and Russell; Towns of Hawkesbury, Vankleekhill; Villages of Casselman, L'Orignal, Rockland	Russell	1,515 00
G. D. Platt, B.A	Prince Edward: Town of Picton; Village of Wellington	Picton	945 00
R. G. Scott, B.A	Renfrew; Towns of Arnprior, Pembroke, Renfrew; Village of Eganville	Pembroke	2,115 00
J. C. Morgan, M.A	Simcoe, North; Towns of Barrie, Midland, Orillia, Penetanguishene	Barrie	1,300 00
Rev. Thomas McKee	Simcoe, South West; Towns of Alliston, Stayner; Villages of Beeton, Bradford, Creemore, Tottenham	Barrie	1,360 00
Isaac Day, B.A	Simcoe, East, and West Muskoka; Town of Gravenhurst; Village of Port Carling	Orillia	1,317 50
Alexander McNaughton.	Stormont; Town of Cornwall	Cornwall	990 00
J. H. Knight	Victoria, East; Town of Lindsay; Villages of Bobcaygeon, Omemee	Lindsay	781 00
Henry Reazin.	Victoria, West, and South-East Muskoka; Town of Bracebridge; Villages of Fenelon Falls, Woodville	Lindsay	1,478 00
Thomas Pearce	Waterloo; Towns of Berlin, Galt, Preston; Villages of Ayr, Elmira, Hespeler, New Hamburg.	Berlin	2,170 00
J. H. Ball, M.A	Welland; Town of Thorold; Villages of Bridgeburg, Chippewa, Fort Erie, Niagara Falls South, Port Colborne	Welland	1,210 00
David Clapp, B.A	Wellington, North; Towns of Harriston, Mount Forest, Palmerston; Villages of Arthur, Clifford, Drayton	Harriston	1,100 00
J. J. Craig, B.A	Wellington, South; Villages of Elora, Erin, Fergus	Fergus	1,100 00
J. H. Smith	Wentworth; Town of Dundas; Village of Waterdown	Hamilton	1,260 00
A. B. Davidson, B.A.	York, North; Towns of Aurora, Newmarket; Villages of Holland Landing, Richmond Hill, Sutton	Newmarket	1,060 00
David Fotheringham	York, South; Towns of North Toronto, Toronto Junction; Villages of East Toronto, Markham, Stouffville, Weston, Woodbridge	Toronto	1,222 50
Donald McCaig	Districts of Algoma, Thunder Bay, Rainy River; Towns of Fort William, Gore Bay, Little Current, Port Arthur, Rat Portage, Sault Ste. Marie, Thessalon	Collingwood	1,966 09

* Appointed in 1899.

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List of Inspectors

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1899.
			$ c.
Rev. George Grant B.A.	Districts of North Nipissing and West Parry Sound; Towns of Mattawa, North Bay, Parry Sound, Sturgeon Falls, Sudbury	Orillia	1,870 00
Wm. Houston, M.A.	Manitoulin Island, etc	Gore Bay	720 10
Rev. A. McColl, D.D.	City of	Chatham	400 00
Wm. Tytler, B.A.	"	Guelph	500 00
W. H. Ballard, M.A.	"	Hamilton	2,000 00
W. G. Kidd	"	Kingston	1,400 00
W. J. Carson	"	London	1,570 00
John C. Glashan, LL.D.	"	Ottawa	2,000 00
*S. Silcox, B.A., B.Paed	"	St. Thomas	357 00
J. R. Stuart	"	Stratford	1,000 00
James L. Hughes	"	Toronto	3,000 00
W. F. Chapman	"	"	2,000 00
Robert Meade, M.A.	Town of	Brockville	900 00
Donald McCaig	"	Collingwood	175 00
C. W. Chadwick	" Forest	Toronto	50 00
Duncan Walker, B.A.	"	Peterborough	1,100 00
Thomas Hilliard	"	Waterloo	80 00
*James H. Ball, M.A.	Niagara Falls, Welland	Welland	160 00
		Total	96,163 69

—	Post Office.	Salary 1899.	Travelling expenses 1899.	Total.
Separate School Inspectors:		$ c.	$ c.	$ c.
James F. White	Toronto	1,850 00	550 00	2,400 00
Wm. Pendergast, B.A	Toronto	1,700 00	414 25	2,114 25
†Michael O'Brien	Peterboro'			
Inspector of Bilingual Training and Elementary Schools:				
†Telesphore Rochon, B.A	Ottawa			
County Model School Inspector:				
John J. Tilley	Toronto	1,850 00	569 85	2,419 85
High School Inspectors:				
John E. Hodgson, M.A.	Toronto	2,500 00	450 00	2,950 00
John Seath, B.A.	Toronto	2,500 00	417 70	2,917 70
Total				12,801 80
Grand total				108,965 49

* Appointed in 1899, duties commenced in 1900. † Appointed in 1900.

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II. Diplomas for Rural School Premises, 1900.

Name of Inspector.	Jurisdiction.	No. schools open.	No. diplomas.	Name of Inspector.	Jurisdiction.	No. schools open.	No. diplomas.
M. J. Kelly	Brant	61	3	J. B. Grey	Lincoln	64	13
A. Campbell	W. Bruce	82	3	P. J. Thompson	E. Middlesex	100	24
A. Brown	Dundas	76	27	H. D. Johnson	W. Middlesex	79	4
W. E. Tilley	Durham	102	7	J. McBrien	N. Ontario	59	8
W. Spankie	Frontenac	140	6	J. Waugh	S. Ontario	55	17
D. McDiarmid	Glengarry	71	16	W. Carlyle	Oxford	106	2
A. Grier	E. Grey	66	2	W. Irwin	Perth	110	19
N. W. Campbell	S. Grey	88	17	G. D. Platt	Prince Edward	77	18
S. Phillips	Haliburton, N. E. Muskoka, S. Nipissing and E. Parry Sound	115	1	Isaac Day	E. Simcoe, W. Muskoka	94	9
				J. H. Knight	E. Victoria	44	1
				T. Pearce	Waterloo	82	22
J. S. Deacon	Halton	61	13	D. Clapp	N. Wellington	68	2
D. Robb	E. Huron	82	8	J. J. Craig	S. Wellington	64	30
J. Elgin Tom	W. Huron	94	14	J. H. Smith	Wentworth	73	21
R. Park	W. Kent	74	35	A. B. Davidson	N. York	85	4
C. A. Barnes	No. 1, Lambton	101	6	D. Fotheringham	S. York	66	3
W. Johnston	No. 1, Leeds	78	22	G. Grant	W. Parry Sound and N. Nipissing	101	13
R. Kinney	No. 2, Leeds	83	12				

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APPENDIX E.—*SUPERANNUATED TEACHERS*, 1900.

(*Continued from Report of 1899.*)

1. † Allowances granted during 1900.

Register No.	Name.	Age.	Post Office.	Years of Service.	Allowance.
					$ c.
1048	Rannie, Wm	52	Newmarket	32	224 00
1049	Caswell, Thomas B	59	Carleton Place	38	259 00
1050	Norton, Theophilus	54	Glen Williams	27½	192 50
1051	Shaw, John	62	Teeswater	40½	279 00
1052	Davidson, Wm	58	Hamilton	34	238 00
1053	Pomeroy, Mrs. Margt. A	63	Napanee	36	251 00
1054	Hickson, Wm	51	Bobcaygeon	24	166 00
1055	Taylor, Chas. James	44	Elmhedge	21	126 00
1056	Davis, Flavelle	57	Allanburg	36	250 00
1057	Bell, Helen	59	Owen Sound	18	126 00
1058	Crawford, Peter	53	Mitchell's Bay	30½	209 50
1059	Gibson, James	57	Cherry Valley	13	91 00
1060	*Lee, Fred	52	Hamilton	16	96 00
1061	*Wilson, Abraham	62	Ventnor	16	96 00
1062	*Mathewson, William	60	Falding	25	150 00
1063	*Banks, Moltimore	50	Jordan Station	26	176 00
1064	*Grey, James B	69	St. Catharines	48½	339 50
1065	*Sutherland, Philip McK	54	Arnprior	18½	111 00
1066	*McEachren, Wm. C	60	Guelph	35½	233 00
1067	*Carnochan, Janet	61	Niagara	39	273 00
1068	*Fulton, James	58	Cainsville	27	189 00
1069	*Reid, Wm. Kirk	61	Durham	36	248 00

2. Summary for Years 1882-1900.

Year.	Number of teachers on list	Expenditure for the year.	Gross contributions to the fund.	Amount refunded to teachers.
		$ c.	$ c.	$ c.
1882	422	51,000 00	13,501 08	8,660 10
1887	454	58,295 33	1,489 00	3,815 80
1891	456	63,750 00	1,313 50	786 86
1897	424	62,800 33	847 00	620 27
1898	420	64,851 88	1,472 00	284 58
1899	423	63,682 28	1,239 00	412 00
1900	418	63,871 43	1,271 75	879 52

Eleven teachers withdrew their subscriptions from the fund during 1900.

† As the sum of $4 is deducted from each Superannuated Teacher's allowance, as subscription to the fund, the payments were $4 less in each case than given above.

* Allowance commences with 1901.

APPENDIX F.—*TEACHERS' INSTITUTES. FINANCIAL STATEMENT, 1899.*

Name of Institute.	No. of Institutes.	Number of members.	Receipts. Government grants.	Receipts. Municipal grants.	Receipts. Members' fees.	Receipts. Balances and other sources	Receipts. Total receipts.	Expenditure. Printing, postage, etc.	Expenditure. Libraries, educational journals, etc.	Expenditure. Miscellaneous.	Expenditure. Total expenditure.	Balances.
			$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Algoma, East	1	30	25 00	....	....	2 15	27 15	5 52	10 30	50	16 32	10 83
" West	1	23	25 00	....	....	5 09	30 09	1 76	17 25	4 25	23 26	6 83
Brant	1	142	25 00	25 00	....	144 25	194 25	....	6 75	28 00	29 75	164 50
Bruce, East	1	120	25 00	25 00	....	25 84	75 84	9 36	19 00	26 99	55 35	20 49
" West	1	28	25 00	25 00	7 00	163 28	220 28	13 93	34 25	63 25	111 43	108 85
Carleton	1	134	25 00	50 00	....	25 67	100 67	5 09	....	36 00	41 09	59 58
Dufferin	1	9	25 00	25 00	2 25	6 22	58 47	5 20	36 27	17 00	58 47	....
Dundas	1	105	25 00	25 00	21 50	39 65	111 15	41 39	....	21 15	62 54	48 61
Durham	1	120	25 00	25 00	....	115 01	165 01	9 37	....	42 25	51 62	113 39
Elgin	1	150	25 00	25 00	....	86 40	136 40	....	4 00	....	4 00	132 40
Essex, North	1	62	25 00	50 00	....	54 53	129 53	8 00	....	54 00	62 00	67 53
" South	1	*106	25 00	50 00	....	138 88	213 88	33 50	....	18 80	52 30	161 58
Frontenac	1	147	25 00	25 00	....	37 56	87 56	3 78	....	29 50	33 28	54 28
Glengarry	1	96	25 00	25 00	....	39 91	89 91	22 76	....	35 85	58 61	31 30
Grenville (Leeds, No. 3)	1	100	25 00	25 00	....	44 42	94 42	10 92	....	33 30	44 22	50 20
Grey, East	1	41	25 00	25 00	10 25	66 87	127 12	45	....	59 18	59 63	67 49
" South	1	53	25 00	25 00	13 25	236 84	300 09	1 76	77 75	61 25	140 76	159 33
" West	1	52	25 00	25 00	13 00	49 87	112 87	15 80	8 25	50 00	74 05	38 82
Haldimand	1	114	25 00	25 00	....	170 84	220 84	10 45	....	2 95	13 40	207 44
Haliburton	1	*25	25 00	25 00	6 00	75 83	131 83	3 19	40 71	34 75	78 65	53 18
Halton	1	90	25 00	25 00	....	129 35	179 35	3 50	19 10	46 55	69 15	110 20
Hastings, North	1	115	25 00	25 00	20 60	142 19	212 79	6 80	28 82	35 00	70 62	142 17
" South	1	130	25 00	25 00	....	291 68	341 68	4 50	....	41 00	45 50	296 18
Huron, West (S.)	1	47	25 00	25 00	21 50	51 63	123 13	5 75	....	39 42	45 17	77 96
" East (N.)	1	123	25 00	25 00	....	108 63	158 63	14 85	18 00	62 15	95 00	63 63
Kent, East	1	90	25 00	25 00	....	118 40	168 40	4 50	....	105 87	110 37	58 03
" West (C. D.)	1	138	25 00	25 00	23 75	47 77	121 52	14 10	....	46 10	60 20	61 32
Lambton, East	1	115	25 00	25 00	30 95	90 82	171 77	38 15	....	66 70	104 85	66 92
" West	1	120	25 00	25 00	....	71 13	121 13	35 85	....	12 90	48 75	72 38
Lanark	1	158	25 00	25 00	16 80	156 78	225 58	2 50	45 05	42 10	89 65	135 93
Leeds, West (1)	1	105	25 00	25 00	....	101 06	151 06	2 04	46 35	29 90	78 29	72 77
" East (2)	1	140	25 00	25 00	25 50	248 78	319 28	11 94	88 80	90 65	191 39	127 89
Lennox and Addington	1	*131	25 00	25 00	....	64 84	114 84	12 15	....	64 45	76 60	38 24
Lincoln	1	120	25 00	25 00	....	185 08	235 08	5 54	....	37 00	42 54	192 54
Manitoulin	1	21	25 00	....	....	15 00	40 00	....	....	5 00	5 00	35 00
Middlesex, East	1	108	25 00	85 00	26 25	39 99	176 24	105 02	42 15	....	147 17	29 07
" West	1	110	25 00	100 00	47 75	75 63	248 38	48 61	2 00	131 00	181 61	66 77
Muskoka	1	*75	25 00	....	....	85 90	110 90	11 60	....	3 75	15 35	95 55
Nipissing	1	13	25 00	....	3 25	8 00	36 25	5 80	....	18 74	24 04	12 21
Norfolk	1	137	25 00	25 00	....	129 68	179 68	46 01	....	34 75	80 76	98 92

Northumberland	1	150	25 00	24 85		210 96	260 81	10 25	21 75	36 65	68 65	192 16
Ontario	1	155	25 00	25 00		187 32	187 32	17 38		121 75	139 08	48 24
" North	1	92				25 00	25 00					25 00
Oxford	1	186	25 00			68 22	93 22	6 19		21 99	28 18	65 04
Parry Sound, East	1	20	25 00		5 00	2 75	32 75	4 90		18 00	17 90	14 85
" West	1	40	25 00		5 50	35 00	65 50	2 60	28 50	25 00	56 10	9 40
Peel	1	104	25 00	25 00		1 76	51 76	7 00			7 00	44 76
Perth	1	145	25 00	25 00		70 94	120 94	20 29		71 10	91 39	29 55
Peterborough	1	110		25 00		101 94	126 94	16 70	49 81	23 00	89 51	37 43
Prescott and Russell	1	*118	25 00	25 00		50 98	100 98	3 02		75 75	78 77	22 21
Prince Edward	1	90	25 00	25 00		103 17	153 17	4 95	31 63	17 75	54 33	98 84
Renfrew	1	75	25 00	25 00		42 63	92 63	15 20	10 50	23 00	48 70	43 93
Simcoe, East, and Muskoka, West	1	70	25 00	25 00		73 55	123 55	5 10	21 64	28 25	54 99	68 56
" North	1	148	25 00	75 00	15 75	57 56	173 31	56 21		47 55	108 76	69 55
" Southwest	1	47	25 00	25 00	11 75	200 11	261 86	13 90		17 50	31 40	230 46
Stormont	1	54	25 00	25 00	22 25	36 03	108 28	32 12	26 00	19 70	77 82	30 46
Victoria, East	1	83	25 00	37 50		95 24	157 74	26 25	34 20	32 00	92 45	65 29
" West	1	*75	25 00	25 00		29 66	79 66	6 50	19 00	13 35	38 85	40 81
Waterloo	1	105	25 00	25 00	52 50	37 35	139 85	18 37		91 70	110 07	29 78
Welland	1	138	25 00	25 00		154 07	204 07	9 45		116 95	126 40	77 67
Wellington, North	1	106	25 00	25 00	12 00	63 49	125 49	11 80	50 00	10 40	72 20	53 29
" South	1	120	25 00	25 00		65 92	115 92	7 56		41 95	49 51	66 41
Wentworth	1	106	25 00	25 00		102 58	152 58	12 00	20 55	38 00	70 55	82 03
York, North	1	63	25 00	25 00	15 75	115 94	181 69	15 64	84 05	36 02	135 71	45 98
" South	1	65	25 00	25 00	13 00	130 48	193 48	12 35	8 50	14 50	35 35	158 13
Prescott and Russell (Fr.-Eng.)	1	80	25 00	25 00		25 00	75 00	5 60		25 40	31 00	44 00
†Ontario Educational Association	1	635	600 00		317 50	591 68	1,509 18	846 33		316 75	1,163 08	346 10
Cities— Guelph	1	38	25 00	25 00		67 79	117 79	52	45 91	11 86	58 29	59 50
Hamilton	1	185	25 00	25 00		111 08	161 08	16 64		59 20	75 84	85 24
†Kingston	1	*60	25 00	25 00	24 25	108 92	183 17	3 61	29 45	75 55	108 61	74 56
London	1	164	25 00	25 00	24 50	68 66	148 16	6 75	28 45	64 60	99 80	43 36
Ottawa	1	152	25 00	25 00		37 99	87 99	2 37	25 00	14 02	41 39	46 60
St. Catharines	1	25	25 00	25 00		48 72	98 72		47 60	12 55	60 15	38 57
St. Thomas	1	41	25 00	25 00		26 98	76 98	4 00		24 67	28 67	48 31
Toronto	1	669	25 00	25 00	148 25	409 10	602 85	40 24	195 07	197 35	432 66	169 69
Windsor and Walkerville	1	60	25 00	25 00		86 70	136 70	4 85		120 00	124 85	11 85
Total, 1899	76	8,309	2,425 00	1,922 35	952 60	7,283 72	12,583 67	1,847 53	1,822 41	3,385 81	6,555 75	6,027 92
" 1898	75	8,238	2,650 00	1,857 50	876 25	7,245 74	12,629 49	1,747 63	1,526 84	3,459 13	6,733 60	5,895 89
Increase	1	71		64 85	76 35	37 98		99 90				132 03
Decrease			225 00				45 82		204 43	73 32	177 85	

* Statistics of preceding year. † Statement for 1899-1900.

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APPENDIX G.—*CONTINUATION CLASSES, 1899-1900.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A.	B.	C.	D.
W. J. Kelly, M.D., LL.B	Brant	Arthur E. Green	I	4	8 S. Dumfries		1		
		John Hicks	II	2	8 Burford		1		
		Alberta A. Langs	II	1	11 "			1	
		Jean Gissing	II	1	6 "				1
		K. McK. Smith	II	2	18 "				1
		Thos. M. Cawley	III	1	4 Brantford				1
		Fred. Wolfe	I	2	22 "				1
		Jos Poole	II	1	24 Burford				1
		Clara Bedford	III	1	15 "				1
		Carrie Fyle	III	1	21 "				1
		Maud M. Costin	II	1	14 "				1
W. S. Clendening	Bruce, E	R. D. McMurchy	I	8	Chesley, V	1			
		J. H. Lipsett	II	3	Tara, V			1	
		J. F. Loney	II	2	U. 8 Amable and Arran			1	
		J. W. Ward	II	3	14 Carrick				1
		S. C. Cooper	III	2	1 Eastnor				1
A. Campbell	Bruce, W	W. I Chisholm, M.A.	I	6	Paisley, V	1			
		D. D. Yule	I	4	Lucknow, V		1		
		J. E. Coombes	II	4	Teeswater, V		1		
		E. S. Coultes	I	3	10 Huron		1		
		John D. Campbell	II	1	12 Culross			1	
		Jos. Stalker	II	1	10 Kinloss			1	
		Ed. W. Bradwin	III	1	3 Culross				1
		Elizabeth A. Sharpe	III	1	4 "				1
		Charlotte Crowston	II	1	6 Kinloss				1
B. H. Cowley, B.A	Carleton	T. A. Colquhoun	I	3	11 Osgoode	1			
		J. L. Bryant	I	3	Richmond, V				1
		Thos. E. Gilmore	II	1	5 Gloucester				1
		W. C. McKendry	III	2	3 N. Gower				1
		R. A. A. McConnell	II	2	3 Huntley				1
		Sara Heanin	II	1	7 Nepean				1
		Jas. M. Roxburgh	II	1	20 Osgoode				1
		Jessie Potter	II	2	18 "				1
		Thos. N. Lewis	III	1	6 Marlborough				1
		Hattie Seabrook	II	1	14 Goulbourn				1
N. Gordon	Dufferin	D. Campbell	II	5	Grand Valley V	1			
		M. H. Langs	I	6	Shelburne, V	1			
		John T. Kidd	II	1	11 Mulmur			1	
		Laban Boggs	II	1	4 E. Garafraxa				1

		Ella Wilson	II	1	5 E. Luther				1
		R. A. Winter	II	2	2 Melancthon			1	
		Minnie Babe	III	1	19 Mono				1
A. Brown	Dundas	E. Maud Hill	I	6	Winchester, V	1			
		S. W. Hill	I	5	Chesterville, V	1			
		Eli. Robinson	II	3	12 Williamsburg			1	
		L. D. McIntosh	III	2	6 Mountain			1	
		Wm. King	III	1	14 Williamsburg				1
		Eliza Robinson	III	1	17 & 24 "				1
		Wm. N. Wright	II	2	18 & 1 "				1
		L. Minnie Ker	II	3	4 Winchester				1
		P. A. McIntosh	III	1	12 Mountain				1
		Wm. Beggs	III	1	22 "				1
W. E. Tilley, M.A., Ph.D.	Durham	D. Hampton	II	4	Millbrook, V	1			
		Hugh Simpson	I	3	12 Clarke			1	
		Wm. H. Metcalf	II	2	15 Manvers			1	
		R. F. Blackstock	I	1	1 S. Monaghan			1	
		Wm. Argue	III	2	7 Manvers				1
		T. J. Ryan	III	2	9 "				1
W. Atkin	Elgin	Wm. Wallis	II	4	5 Aldborough	1			
		Jos. L. Garvin	I	4	6 "	1			
		Edward Witty	II	2	Port Stanley, V		1		
		George Stewart	II	3	Springfield, V		1		
		Edward Wyatt	I	3	11 S. Dorchester		1		
		James W. Brown	II	2	9 Southwold		1		
		John McFadyen	II	2	12 "		1		
		Henry Wing	III	2	13 Dunwich		1		
		Wm. Walker	II	2	2 Bayham			1	
		A. H. Nevills	II	2	18 "			1	
		David Andrews	I	1	10 Dunwich			1	
		Angus McIntyre	III	1	15 Malahide			1	
		J. U. McLennan	III	1	11 Southwold			1	
		C. A. Norman	II	1	9 Yarmouth			1	
		R. F. Whiting	II	2	8 "			1	
		Bertha Sanders	III	1	18 "			1	
		S. R. Armstrong	II	1	2 Aldborough				1
		L. L. Harrison	III	3	3 "				1
		Tena Beaumes	III	1	9 "				1
		Peter McCallum	II	1	12 "				1
		James Amoss	II	2	16 Bayham				1
		Jane Brighty	II	1	22 Malahide				1
		Jessie Blackwood	II	1	1 Southwold				1
		Ada Walker	III	1	27 Yarmouth				1
D. A. Maxwell, B.A., LL.B.	Essex, S.	Jno. H. Porter, Jr.	I	4	4 Tilbury, W	1			
		J. F. Voaden	II	6	Kingsville, V		1		
		C. N. Evans	I	4	Amherstburg, T.		1		
		Jas. H. Black	II	8	9 Colchester, S			1	
		F. W. Wegenast	II	1	2 " S				1
		Harry E. Ricker	III	1	5 " S				1
		Samuel Beneteau	II	1	1 Sandwich, W				1
W. Spankie, M. D.	Frontenac	Kate Keenan	II	1	2 Pittsburgh				1

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Name of Inspector.	Jurisdiction.	Name of principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A.	B.	C.	D.
W. Spankie, M.D	Frontenac	L. Hamilton	III	2	12 Portland	....	....	....	1
D. McDiarmid, M.D	Glengarry	Finlay Hood	I	3	Lancaster, V	....	....	1	....
		Wm. B. McEwan	II	3	12 Charlottenburgh	....	....	1	....
A. Grier	Grey, E	T. M. Galbraith	III	2	U. 4 Euphrasia	....	....	1	....
		E. E. Farewell	I	4	Thornbury, T.	....	....	1	..
		T. A. Wright	II	1	U. 5 Collingwood	....	....	1	....
		D. Forrester	I	2	13 Collingwood	....	....	....	1
		Rosa Black	III	2	U. 5 Euphrasia	....	....	....	1
N. W. Campbell	Grey, S	T. Allan	I	6	Durham, T	1	....	....	....
		J. W. Brown	I	7	Hanover, V	1	....	....	....
		Jas. S. Rowe	II	4	Markdale, V	....	1	....	....
		Geo. W. Slaughter	I	3	5 Artemesia	....	1	....	....
		J. A. Speers	I	4	Dundalk, V	....	1	....	....
		W. J. Blakeston	II	2	U. 12 Artemesia and Glenelg	....	....	1	....
		N. McIntosh	III	1	11 Normanby	....	....	....	1
C. Moses	Haldimand	David Duff	II	4	10 Walpole	1	....	....	....
		D. T. Aiken	I	2	8 "	....	....	1	....
		Kate Smith	II	1	16 "	....	....	....	1
S. Phillips, B.A	Haliburton, etc.	A. M. Burchill	I	5	Burk's Falls, V	1	....	....	....
		H. I. Case	I	2	4 N. Himsworth	....	....	....	1
		D. T. Wright	I	7	Huntsville, V	....	....	....	1
J. S. Deacon	Halton	W. F. Inman	I	8	Milton, T	1	....	....	....
		A. Baynton	II	6	Burlington, V	....	....	1	....
		W. J. McClenahan	II	1	3 Nelson	....	....	....	1
		Lily Dales	III	1	12 "	....	....	....	1
		W. F. Seaman	III	1	5 "	....	....	....	1
W. Mackintosh	Hastings, N	E. T. Williams	II	3	4 Marmora	....	..	....	1
J. Johnston	Hastings, S	Robinson A. Morton	II	2	1 Hungerford	....	....	1	....
		John M. Bell	II	1	3 "	....	....	1	....
		George Meiklejohn	II	4	Tweed, V	....	....	1	....
		W. A. Black	II	2	11 Sidney	....	....	1	....
		M. W. Mott	II	2	12 and 14 Thurlow	....	....	1	....
		Thos. J. Meagher	III	1	7 Tyendinaga	....	....	....	1
		J. E. Chambers	III	2	18 Hungerford	....	....	....	1
D. Robb	Huron, E	A. H. Musgrove	II	8	Wingham, T	1	....	....	....
		J. H. Cameron	I	4	Brussels, V	....	1	....	....
		Alex. McEwan	II	2	4 Turnberry	....	1	....	....
		Wm. J. Scott	I	4	Blyth, V	....	....	1	....
		Geo. Spotton	II	2	Wroxeter, V	....	....	1	....
		Geo. E. McKee	II	2	7 Howick	....	....	1	....

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J. Elgin Tom	Huron, W	A. McAllister	III	2	8 Hullett			1	
		John Cook	II	2	5 "			1	
		Andrew Scott	II	1	3 Tuckersmith			1	
		Douglas Fraser	II	1	9 Turnberry			1	
		Maude Wiltse	III	1	2 Grey				1
		E. D. McIntosh	III	1	3 "				1
		Arthur H. Rogers	II	1	4 "				1
		Geo. Dobson	II	2	11 "				1
		Thos. G. Shillinglaw	II	1	9 Tuckersmith				1
		James A. Horton	III	1	10 "				1
		Thos. N. Forsyth	II	1	2 "				1
		Annie McLeod	III	1	9 McKillop				1
		S. J. A. Boyd	I	7	Exeter, V	1			
		Wm. Baird	III	2	10 Stanley		1		
		Geo. W. Holman	II	2	Bayfield, V			1	
		Wm. McKay	II	3	Hensall, V			1	
		Geo. Bloomfield	II	3	5 Stephen			1	
		Wm. B. Bagshaw	II	2	1 "			1	
		Thos. G. Allen	II	2	8 Ashfield			1	
		Edward J. Hagan	II	3	7 Hay			1	
		Tena F. Hawkins	II	2	1 Ashfield				1
		Sarah McLeod	II	1	3 "				1
		Allan Bowles	II	1	13 "				1
		Mary McLennan	II	1	15 "				1
		Jas. H. Tigert	I	1	2 Colborne				1
		Geo. Baird, Sr.	I	1	1 Stanley				1
		W. J. McWilliams	II	1	10 Stephen				1
Rev. W. H. G. Colles	Kent, E	J. C. Hamilton, B.A	II	3	Blenheim, T	1			
		Henry Kelly, B.A	II	4	Bothwell, T	1			
		P. B. Fetterley	II	4	6 Orford	1			
		J. G. Cameron	II	4	Thamesville, V	1			
		J. H. Dempster, B.A	II	2	3 & 4 Orford			1	
		Otto R. Edwards	II	2	2½ Harwich			1	
		Laura Hamil	II	1	7 "				1
		J. R. Newkirk	II	1	9 "				1
R. Park	Kent, W	J. W. Plewes	I	10	Wallaceburg, T	1			
		G. A. Millar	I	8	Dresden, T	1			
		W. A. Hutton	II	3	Tilbury, V			1	
		Gordan Stewart	III	1	11 Dover			1	
		Lydia Broadbent	III	1	7 Raleigh			1	
		S. C. Irwin	II	2	5 Tilbury, E			1	
		John C. Stewart	III	1	11 Chatham				1
		Robt. Brandon	III	1	U. 1 "				1
		H. M. Fleming	III	1	5 Raleigh				1
		Edward Wells	II	1	12 "				1
		Chas. B. Stover	III	1	U. 6 "				1
		W. C. Dainty	II	1	4 Romney				1
		Chas. A. Goodall	III	1	3 S. Tilbury, E				1
		Kate Garrett	II	1	4 " "				1
		Alex. Farquharson	II	1	2 E. " "				1
		Margaret McCornock	II	1	U. 3 Raleigh and Harwich				1

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Name of Inspector.	Jurisdiction.	Name of principal.	Professional Certificate.	No. of Teachers	Name of School.	Class of School. A.	B.	C.	D.
C. A. Barnes, M.A	Lambton, E	C. B. Latta	II	5	Alvinston, V	1			
		C. H. Barnes	II	2	Arkona, V			1	
		N. J. Kearney	II	2	Thedford, V			1	
		Neil McLean	II	4	Wyoming, V			1	
		Wm. J. Green	II	2	5 Euphemia			1	
		J. G. Cochrane	I	1	5 Dawn				1
		Alice Tanner	II	1	10 Warwick				1
		J. W. Walker	II	1	15 "				1
		Frank McCordie	III	1	9 Bosanquet				1
		Chas. E. Johnson	II	1	3 Plympton				1
J. Brebner	Lambton, W	Hugh A. Beaton	II	5	Oil Springs, V	1			
		J. B. Colton	II	3	11 Moore			1	
		Thos. Jarrott	II	2	18 "			1	
		Jas. J. Wilson	II	2	17 Enniskillen			1	
		C. M. Brightwell	II	2	2 Moore				1
		Gertrude Grant	II	2	8 Sombra				1
F. L. Michell, M.A	Lanark	Robt. Beatty	II	5	Lanark, V	1			
		Mima Ellis	II	3	4 Pakenham		1		
		Mary E. Sparrow	II	2	3 Bathurst				1
		Edith M. Butler	II	1	3 Beckwith				1
Wm. Johnston, M.A	Leeds No. 1	D. Hicks, B.A	I	3	4 N. Crosby		1		
		J. H. Holbrook	I	3	Newboro', V		1		
		R. Hanna	II	2	5 S Crosby			1	
		W. H. Foster	II	2	8 Leeds and Lansdowne, R			1	
		Geo. Mitchell	III	2	9 " " F				1
T. A. Craig	Leeds and Grenville	Grant Cooper, B.A		5	Merrickville, V	1			
		Samuel Mars	II	2	15 Edwardsburg			1	
		W. G. Carpenter	III	2	17 Augusta			1	
		Geo. Conley	II	6	Cardinal, V			1	
		W. H. Tackaberry	I	2	8 Oxford				1
		Geo. A. Weedmark	II	2	1 & 5 Oxford				1
F. Burrows	Lennox and Addington	J. H. Davidson, B.A	I	3	Bath, V		1		
		A. L. Gibson	III	1	1 Amherst Island				1
		Herbert Glover	III	1	19 Ernesttown				1
Jas. B. Grey	Lincoln	Robt. Hanham	III	1	4 Gainsboro'				1
		Edgar Farr	II	1	3 "				1
		Eva Stretton	III	1	9 "				1
		Rachel Swick	II	1	10 "				1
		Isabel Springstead	II	1	7 Caistor				1

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P. J. Thompson, B.A	Middlesex, E	Arthur J. Painter	II	1	2 Louth				1
		Alice Hodgins	II	2	7 N. Dorchester			1	
		Geo. Dale	II	2	6 McGillivray			1	
		Flora McColl	II	1	10 Westminster				1
		Edith Stanley	III	1	1 London				1
		Minnie Robinson	III	1	19 "				1
		Bessie Hubbs	II	1	8 & 10 London and Biddulph				1
		John C. Currie	III	1	13 Westminster				1
		John C. Robson	II	2	5 "				1
		A. S. Morton	II	1	1 London and N. Dorchester				1
		Ernest Anderson	II	1	4 Delaware				1
H. D. Johnson	Middlesex, W	Margaret McGowan	II	2	7 Biddulph				1
		Ida S. Hutton	II	1	U. 2 Adelaide				1
		Ben. Parker	II	1	U. 1 & 2 Adelaide				1
		A. F. Demary	III	2	7 Adelaide				1
		Colin Marshall	III	1	1 E. Williams				1
		Chas. George	II	1	7 Lobo				1
		F. C. Dulmedge	II	3	Ailsa Craig, V				1
J. J. Wadsworth, M.A	Norfolk	Jas. W. Hagan	I	4	Delhi, V		1		
		J. Alexander	II	2	6 Charlotteville		1		
		C. E. Brandow	II	2	2 Middleton			1	
		Nettie McKnight	II	1	9 Walsingham			1	
		Jas. H. Smith	III	1	18 Townsend				1
		L. E. Fierhiller	II	1	17 "				1
		James Ross	II	2	19 "				1
		Edna Hagerman	III	2	18 Charlotteville				1
		A. C. Smith	III	2	7 Walsingham				1
		Myra Hagerman	II	1	16 "				1
A. Odell	Northumberland	Wm. J. Wright, M.A	I	4	2 Percy or Warkworth	1			
		W. W. Gould	II	2	16 & 18 Murray and Brighton				1
		J. Courtice	III	1	11 Brighton				1
Jas. McBrien	Ontario, N	R. J. Johnston	II	4	Cannington, V		1		
		J. Givens	II	3	Beaverton, V			1	
		Wm. Fallowedown	II	3	13 Brock			1	
		E. Richardson	II	2	5 Scott			1	
		Marie Cadotte	I	1	7 Mara			1	
		Lizzie Droogan	II	1	4 Brock				1
		D. McQueen	II	1	U. 4 "				1
		A. Bingham	III	1	8 "				1
		Mary McLean	II	1	8 Uxbridge				1
		Jesse McCuaig	II	1	1 Mara				1
		Mabel Dickinson	II	2	7 Uxbridge				1
		Gersham Mason	I	1	3 Mara				1
		T. P. Hart	II	1	4 "				1
		Annie Ross	I	1	10 "				1
		Mary Bradley	III	1	2 Rama				1
		John Joyce	II	1	6 Mara				1
J. Waugh, B.A., D. Paed	Ontario, S	Christine Kelly	III	1	1 Thorah				1
		E. Bradley	III	1	6 E. Whitby				1
		W. G. Ward	II	1	10 Pickering				1
W. Carlyle	Oxford	J. E. Hodgson	I	5	Norwich, V	1			

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APPENDIX G.—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A.	B.	C.	D.
W. Carlyle	Oxford	Jas. W. Fraser, B.A.	I	3	Embro, V		1		
		Chas. Garthwaite	II	3	6 S. Norwich		1		
		Geo. E. Pentland	I	3	24 Blenheim		1		
		Jas. Little	I	3	11 "			1	
		M. B. Hugill	II	2	5 Dereham			1	
		J. Cameron	I	4	U. 13 and 8 E. Zorra and S. Easthope			1	
A. Embury	Peel	John Graham	I	4	Bolton, V	1			
		David Dix	I	2	U. 21 Toronto and 2 Toronto Gore			1	
		Adam C. Wilson		2	15 Caledon			1	
		D. H. Marshall	III	1	7 Chinguacousy				1
Wm. Irwin, B.A	Perth	Andrew McBeth	II	3	Milverton, V		1		
		Christina Kirk	II	1	1 Blanshard				1
		Maggie Amos	III	1	U. 2 Blanshard and Downie				1
		John A. McFarlane	III	1	6 Elma				1
		Kate Heal, B.A		1	2 Fullarton				1
		Alex. Good	II	1	5 "				1
		Eccles Vallance	II	1	U. 6 Logan and Elma				1
		J. Hamwell	II	1	11 Blanshard				1
J. Coyle Brown	Peterborough	W. A. Evans	I	5	Lakefield, V		1		
		Thos. J. Wallace	II	2	4 Otonabee			1	
		Mary L. Holmes	II	2	3 Dummer				1
W. J. Summerby	Prescott and Russell	S. A. Hitsman	I	3	2 Russell		1		
		C. M. Rowe	II	2	Rockland, V			1	
		F. S. Eation	III	2	1 S. Plantagenet				1
		G. O. Wood	III	2	3 Cumberland				1
		C. S. Edwards	III	2	5 "				1
J. D. Platt, B.A	Prince Edward	John A. Rundle	I	2	11 Ameliasburgh		1		
		W. R. McKibbon	II	2	17 Hillier		1		
		J. F. Harvey	III	2	Wellington, V		1		
		W. J. Osborne	I	2	7 Hallowell			1	
		Mrs. J. S. Palen	II	1	6 N. Marysburgh			1	
		E. Vandusen	III	1	12 S. "			1	
		Kenneth Beech	III	1	3 Hillier				1
		J. M. Roote	III	1	1 N. Marysburgh				1
		Annie Colliver	III	1	5 "				1
		E. W. Ferguson	III	1	4 Sophiasburgh				1
R. G. Scott, B.A	Renfrew	Garvin A. Lucas	I	3	Eganville, V		1		
		Jas. E. McDonald	II	1	2 Brudenell			1	
		Geo. E. Fletcher	III	2	6 Ross			1	

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I. Day, B.A.	E. Simcoe and W. Muskoka	Geo. R. Wood	II	2	7 Westmeath			1	
		Tena McDonald	II	1	2 Admaston				1
		Wm. Sullivan	III	1	3 "				1
		Jeanetta Ross	III	1	8 Bromley				1
		Maggie B. Lett	II	1	7 Radcliffe				1
		Jos. Sheahan	III	1	4 Ross				1
		Mary J. O'Reilly	III	1	4 Bagot				1
		Annie J. Stewart	II	2	1 McNab				1
		Maggie D. Taylor	III	2	4 "				1
		Sarah Tewkesbury	II	3	7 Medonte		1		
		R. G. Nesbitt	II	4	12 Tay		1		
		J. F. Hamilton	III	2	5 Nottawasaga			1	
		W. A. Atkinson	III	1	22 "				1
		Chas. Bowes	III	1	1 Humphrey				1
		Geo. Chapman	II	2	4 Medonte				1
		E. Denise	III	1	9 Stephenson				1
		Annie Rix	III	1	13 Medonte				1
J. C. Morgan, M.A.	Simcoe, N	A. McKee	I	10	Midland, T		1		
		M. Johnstone	II	1	3 Sunnidale			1	
		T. Slaughter	II	4	5 Floss			1	
		T. W. Walker	II	1	4 Sunnidale				1
		I. J. McInerney	II	5	Penetanguishene, T				1
		N. S. Kenny	I	4	Prot. Sep. School, Penetanguishene				1
Rev. Thos. McKee	Simcoe, S. W.	Wm. Sparks	I	6	Alliston, T	1			
		Jas. A. McPherson	II	4	Beeton, V	1			
		Jas. A. Brown	I	4	5 Essa	1			
		Thos. Gowan	II	4	Creemore, V	1			
		A. N. Scarrow	I	6	Stayner, T	1			
		T. E. Langford, M.A.	I	4	Tottenham, V	1			
		Jas. Ed. Holt	II	2	10 W. Gwillimbury		1		
		Wm. L. Kidd	I	2	3 Nottawasaga		1		
		Chas. Deering	II	2	10 Innisfil			1	
		Robt. Little	II	1	6 "			1	
		John W. Waldron	III	1	4 Nottawasaga			1	
		Thomas J. Ryan	II	1	4 Adjala			1	
		Nellie Johnston	II	1	9 W. Gwillimbury			1	
		Neil S. McEachern	II	2	10 Essa			1	
		Geo. Wilson	II	1	5 Tossorontio			1	
		Jno. M. McGuire	III	1	8 "			1	
		Thos. Irwin	II	1	4 "			1	
		Wm. L. Bradley	I	1	6 "			1	
		Geo. Sutherland	II	2	14 Nottawasaga			1	
		J. B. Gillesby	I	2	7 Essa				1
		H. R. McCracken	I	1	6 "				1
		Willard Fife	III	1	2 Tossorontio				1
		Agnes Neagle	II	1	5 Adjala				1
		John A. Corbett	II	1	9 Innisfil				1
A. McNaughton	tormont	Hiram B. Fetterly	I	3	14 Roxborough	1			
		Jas. Frosts	I	3	3 Finch	1			
		R. A. Baker	III	3	4 Osnabruck			1	
		Edward J. Cleary	III	2	5 Cornwall			1	

APPENDIX G.—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A.	B.	C.	D.
A. McNaughton	Stormont	Geo. S. Mattice	II	1	9 Osnabruck				1
		Kate M. Sheets	II	1	10 "				1
J. H. Knight	Victoria, E.	Albert E. Bryson	II	4	Bobcaygeon, V		1		
H. Reazin	Victoria, W	Geo. H. Thomas	II	8	Bracebridge, T	1			
		B. H. Mayher	II	6	Fenelon Falls, V		1		
		J. M. Wilson	II	2	Woodville, V		1		
		Chas. Lapp	II	2	8 Mariposa		1		
		Ed. Mosgrove	II	2	8 Eldon			1	
		Duncan McMillan	II	1	1 "			1	
		Alex. Hutchinson	II	2	1 Fenelon			1	
		John Cundal	II	2	6 "				1
		Thomas Mark	II	2	4 "				1
Thomas Pearce	Waterloo	I. G. Baker	II	6	Elmira, V		1		
		J. B. Pomeroy	II	2	7 Woolwich				1
J. H. Ball, M.A	Welland	D. W. McKay	I	4	Port Colborne, V		1		
		K. E. Dadson	I	4	Bridgeburg, V		1		
		Alex. Ross	II	3	Fort Erie, V		1		
		C. E. Hansel	II	3	11 Bertie		1		
		Miss M. Edmondston	II	1	8 Pelham			1	
		Jas. H. Wright	III	2	U. 3 "				1
		Miss B. Zavitz	III	2	1 Humberstone				1
		N. F. Box	II	2	4 Wainfleet				1
		E. Wade	III	1	11 "				1
D. Clapp, B.A	Wellington, N	G. A. Campbell	II	4	Drayton, V	1			
		D. Forsyth	II	8	Palmerston, T	1			
		John A. Gray	II	4	Clifford, V.			1	
		C. Long	II	2	2 Peel			1	
		Jas. Corrigill	I	2	7 "				1
J. J. Craig, B.A	Wellington, S	H. N. Awrey	II	4	Erin, V	1			
		John Strachan	II	3	9 Eramosa		1		
		W. H. Rowan	II	2	6 Erin			1	
		W. F. McKenzie	II	1	8 Guelph			1	
		N. L. Smith	II	1	2 "			1	
		J. G. Gourlay	III	1	5 Pilkington				1
		W. J. Bell	III	1	6 Puslinch				1
J. H. Smith	Wentworth	Chas. H. Stewart	II	3	5 Ancaster			1	
		Frank McCallum	I	2	6 "			1	
		J. S. Jamieson	III	2	7 Beverly			1	
		A. E. Wilcox	II	2	3 Binbrook			1	

		Lillie Reid	III	1	6 E. Flamboro'			1	
		E. W. Jennings	I	2	4 W. "			1	
		Jas. J. Carroll	II	2	2 Glanford			1	
		W. G. Patrick	III	1	6 Beverly				1
		W. H. Marcy	III	1	12 "				1
		Wm. Stuart	II	2	1 E. Flamboro'				1
		R. G. Elliott	I	1	7 "				1
		W. H. Henderson	III	2	9 W. "				1
		C. E. Kelly	I	3	3 Saltfleet				1
		Ethel Addy	III	1	7 "				1
A. B. Davidson, B.A	York, N	Alex. Wilkinson	II	3	14 King			1	
		J. T. Power	II	2	5 E. Gwillimbury				1
		Wm. Park	III	3	Sutton, V				1
D. Fotheringham	York, S	K. Langdon	II	4	Woodbridge, V	1			
		Jas. Hand	II	5	Stouffville, V			1	
		Wm. Hopkings	II	4	N. Toronto, T			1	
		Jas. A. Patrillo	II	2	5 Scarboro'				1
		John W. Johnston	I	6	East Toronto, V				1
		W. French	I	2	10 Markham				1
D. McCaig	Algoma, etc	T. H. Roberts, B.A	I	13	Rat Portage, T	1			
		L. A. Green, B.A	I	8	Sault Ste. Marie, T	1			
		D. M. Christie	I	3	1 Plummer Additional			1	
		John G. Gordon	I	4	Thessalon, T				1
		Jno. B. Stewart	II	2	1 Chapleau				1
Wm. Houston, M.A	Manitoulin Island	R. O. White	I	4	Gore Bay, T	1			
Rev. Geo. Grant, B.A	W. Parry Sound & N. Nipissing	A. M. Currie	I	11	Parry Sound, T	1			
		J. B. McDougall, B A	I	8	North Bay, T	1			
		F. C. Anderson		4	Sudbury, T		1		
		P. H. Thibeaudeau	I	3	Mattawa, T			1	
		Jno. Urquhart, B.A	I	3	Sturgeon Falls, T				1
		H. A. Snowdon	I	4	2 McKim				1
J. F. White	R.C.S.S.'s, E. Ontario	Sr. M. Ernestina		4	Eganville, V	1			
		Sr. St. Andrew		3	4 N. Crosby		1		
		Sr. St. Augustin		3	16 Cornwall			1	
		Annie Wallace	II	1	7 Nepean				1
Wm. Prendergast, B.A	R.C.S.S.'s, W. Ontario	Wm. Gallagher	II	5	Mattawa, T		1		
		R. L. Gaughan	II	2	3 Mara			1	
		Sr. M. Ethelbert		4	Amherstburg, T				1
		Sr. Mary of the Angels		3	Tilbury, V				1
		Sr. Columba		3	1 E. Sandwich				1
		Mary F. Noonan	II	2	2 Ashfield				1
Total						50	54	125	212

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APPENDIX H.—*COUNTY*

Name of Model School.	Name of Principal.	Certificate of Principal.	Salary of Principal.	Year of appointment.	Time Principal devotes to Model School work daily during the term.	No. of assistants with 1st class certificates	No. with 2nd class.
1 Athens	Robt. Thompson	I	$700	1896	all except 2 hrs a week		4
2 Barrie	W. J. Hallett	I	900	1893	all day		8
3 Beamsville	H. J. Talbot	I	600	1898	"	1	3
4 Berlin	Jeremiah Suddaby	I	1,100	1877	"		7
5 Bracebridge	G. H. O. Thomas	I	750	1885	"	2	5
6 Bradford	A. Orton	I	750	1888	"		4
7 Brampton	A. Barber	I	800	1895	"	9	9
8 Caledonia	A. B. Shantz	I	700	1895	"		3
9 Chatham	J. H. Plewes	I	900	1900	"	2	8
10 Clinton	W. R. Lough	I	825	1884	"		5
11 Cornwall	John Connolly	I	940	1892	"		10
12 Durham	Thos. Allan	I	700	1888	"	1	3
13 Elora	L. K. Fallis	I	650	1894	"	1	4
14 Forest	Jas. Campbell	I	725	1894	"		5
15 Galt	R. Alexander	I	1,000	1875	"	2	5
16 Gananoque	J. C. Linklater	I	1,000	1888	"	2	6
17 Goderich	Robert Stewart	I	700	1900	"	2	10
18 Hamilton	W. W. Charters	B A.	800	1900	"	1	5
19 Ingersoll	H. F. McDiarmid	I	900	1885	"	2	7
20 Kincardine	F. C. Powell	I	850	1877	"		3
21 Kingston	L. E. Staples	M.A.	700	1899	"		9
22 Lindsay	G. E. Broderick	I	1,000	1888	"	2	17
23 London	Geo. B. Kirk	I	1,200	1900	"	1	8
24 Madoc	T. C. Tice	I	700	1897	"	1	5
25 Meaford	M. N. Clark	I	650	1899	5 hours		3
26 Milton	Wm. F. Inman	I	750	1893	all day		4
27 *Minden					"		1
28 Mitchell	J. H. W. McRoberts	I	600	1899	"	1	5
29 Mt. Forest	G. R. Theobald	I	700	1900	"		7
30 Morrisburg	A. E. Meldrum	I	800	1895	"	1	4
31 *Napanee	C. H. Edwards	B.A.	750	1899	"	2	7
32 Newmarket	John W. Forhan	I	625	1899	"		5
33 Norwood	Joseph Trappy	I	600	1900	5 hours		5
34 Orangeville	M. N. Armstrong	I	800	1885	all day	1	8
35 Owen Sound	T. A. Reid	I	1,000	1894	"		25
36 *Parry Sound	A. M. Currie	I	700	1896	"	2	5
37 Perth	M. M. Jaques	I	1,000	1884	"		8
38 Picton	R. F. Greenlees	I	800	1886	"		7
39 Port Hope	F. Wood	I	1,000	1885	all day		13
40 Port Perry	Alex. McRae	I	800	1877	"	3	2
41 Prescott	A. A. Jordan	I	1,000	1899	"		7
42 Renfrew	W. A. Stickle	I	600	1900	"		5
43 Richmond	J. L. Bryant	I	550	1900	"		3
44 St. Thomas	S. Silcox	B.A., B.Paed.	1200	1900	all exc'pt duties as Ins.	2	6
45 Sarnia	A. Wark	I	950	1877	all day	1	8
46 Simcoe	Isaac S. Rowat	I	800	1889	"	1	7
47 Stratford	J. Russell Stuart	I	1,000	1887	all exc'pt duties as Ins.	1	19
48 Strathroy	Thos. Dunsmore	I	850	1882	all day		8
59 Toronto	W. E. Groves	I	1,300	1895	"	2	9
50 Toronto Junction	Wm. Wilson	I	1,000	1889	"		11
51 Vankleekhill	Sam J. Keys	I	750	1898	"		4
52 Walkerton	E. J. Rowlands	I	850	1893	"		9
53 Whitby	J. A. Brown	I	950	1877	"	1	2
54 Windsor	G. W. Chisholm	I	900	1895	"		8
55 Woodstock	S. Nethercott	I	950	1892	"		29
Total		4 Grad's Bal. I				47	397

* Statistics for preceding year ; no reports received.

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MODEL SCHOOLS, 1900

No. with 3rd class.	No. with other class.	Time assistant relieved Principal from public school work daily.	Is separate room provided?	Is there a professional library? No. of volumes.	Government grants.	Municipal grants.	Fees.	No. of divisions in school.	No. of divisions used for Model School purposes.	No. of students sent at one time to observe or teach.	Length of time students are trained before being sent to the divisions to observe.	Length of time students are trained before being sent to the divisions to teach.
....	.....	all day.	yes.	75	$150	$150	$160	4	4	8	6 wks	6½ wks
....	......	“	“	59	150	150	100	8	8	2 or 3	6 “	6 “
....	......	“	“	92	150	150	130	4	4	7	6 “	6 “
3	....	“	“	*150	150	150	45	10	10	2 or 3	6 “	6 “
1	......	“	“	*130	300	....	55	9	7	5	5 “	6 “
....	......	“	“	*67	150	150	90	4	4	5	6 “	6 “
....	......	“	“	100	150	250	95	10	10	4	6 “	8 “
....	......	“	“	165	150	150	35	4	4	2	6 “	6 “
1	....	“	“	310	150	150	135	11	11	3	2 “	5 “
....	1	“	“	60	150	150	115	7	7	3 or 4	6 “	6 “
....	......	“	“	150	150	150	127	11	8	3	6 “	6 “
....	3	“	“	50	150	150	35	7	5	2 to 7	6 “	8 “
....	......	“	“	75	150	150	90	5	5	4	7 “	9 “
....	......	“	“	65	150	150	75	6	5	3	7 “	7 “
1	....	“	“	*64	150	....	55	9	8	11 or 4	5 “	8 “
3	......	“	“	69	150	150	30	12	6	2	6 “	7 “
....	......	“	“	50	150	150	115	12	12	4	4 “	5 “
1	1	“	“	650	150	150	140	8	7	2	5½ “	5½ “
3	......	“	“	56	150	150	45	13	10	3	6 “	7 “
3	......	“	“	66	150	150	50	6	6	3	7 “	7 “
....	1	“	“	150	150	150	130	9	9	4	6 “	6 “
....	......	“	“	60	150	150	85	19	9	2	5 “	7 “
....	......	“	“	50	150	89	160	10	9	4	2 “	4 “
....	......	“	“	44	150	250	81	6	6	2 or 3	6 “	6 “
4	.....	5½ hrs.	“	57	150	150	55	8	8	3	6 “	9 “
2	......	all day	“	62	150	200	45	7	5	3	6 “	6 “
1	......	“	“	54	150	150	75	3	3	8	6 “	6½ “
1	......	“	“	60	150	150	95	7	7	3	6 “	6 “
1	......	“	“	71	150	150	140	9	8	3 or 4	6 “	6 “
2	......	“	“	72	150	150	100	7	6	3 or 4	7 “	7 “
....	......	“	“	90	150	....	....	10	7	2	7 “	7 “
....	......	“	“	55	150	175	60	6	6	2	6 “	6 “
....	......	5 hrs.	“	50	150	150	80	5	5	4	1 mo.	1⅔ mos
....	......	all day	“	68	150	150	95	9	9	2	7 wks	7 wks
1	....	....	“	90	150	150	90	26	11	2	6 “	7½ “
....	2	all day	“	62	300	....	105	9	7	4	6 “	8 “
....	1	“	“	68	150	150	5	10	10	5	6 “	7 “
....	......	“	“	*60	150	150	65	8	8	3	5 “	6 “
2	......	all day	“	110	150	200	145	15	12	3	6 “	6 “
2	......	“	“	75	150	150	100	6	6	4	6 “	7 “
....	......	“	“	78	150	150	60	7	6	2	6 “	6 “
2	......	“	“	63	150	150	105	8	7	3	5 “	7 “
....	......	“	“	61	150	500	80	3	3	4 or 5	2½ “	3 “
3	......	....	“	85	150	150	155	11	11	3	6 “	6 “
....	......	....	“	60	150	150	85	9	9	3	6 “	6 “
....	......	all day	“	135	150	150	70	8	8	2	7 “	8 “
3	......	....	“	200	150	150	150	23	23	3	6 “	6 “
....	......	all day	“	76	150	150	85	9	9	2	6 “	6 “
....	3	“	“	194	150	150	175	12	11	12 or 2	2 “	5 “
....	......	“	“	75	150	150	90	11	11	2	6 “	6 “
....	......	“	“	60	150	200	65	4	4	3	6 “	7 “
....	......	“	“	45	150	150	100	9	9	2 or 3	6 “	6 “
1	3	“	“	79	150	150	45	7	7	3	6 “	7 “
....	......	“	“	80	150	150	85	8	8	2 or 3	7 “	7 “
....	......	“	“	*115	150	150	110	30	20	2	6 “	8 “
41	15	....	......	5,267	$8,550	$8,314	$4,843	.....	......	....	......	.....

APPENDIX H.—*COUNTY*

	Name of Model School.	Number of weeks students teach in the divisions.	Number of hours per day.	Total number of classes in the divisions used for Model School purposes.	Average number of lessons taught by each student during the term.	Average number of lessons each class will be taught by all the students during the term.	Average length of each lesson.	Time students remain in a division before passing to another.	Number of students on roll.
1	Athens	7	1½	11	20	59	20 min.	2 days	31
2	Barrie	8	1 to 1½	18	22	35	20 "	1 week	21
3	Beamsville	7	1½	9	15	44	20 "	8½ days	26
4	Berlin	6	1¾	16	12	16	20 "	4 "	9
5	Bracebridge	6	2	16	20	16	15 "	2 "	13
6	Bradford	7	3	10	16	28	20 "	1 week	18
7	Brampton	6	1½	20	25	25	20 "	4 days	20
8	Caledonia	7	1	8	18	16	20 "	1 week	7
9	Chatham	4	1	15	28	3	20 "	2 days	27
10	Clinton	5	⅔	15	20	11	18 "	3 "	23
11	Cornwall	6	1	16	18	25	20 "	1 week	22
12	Durham	4	1	12	20	12	20 "	2 days	7
13	Elora	4	1¼	14	18	28	17 "	2 "	18
14	Forest	6	1	11	18	25	20 "	1 week	15
15	Galt	4	1½	14	20	16	20 "	1 day	11
16	Gananoque	6	¾	14	22	10	20 "	1 week	6
17	Goderich	6	1¾	10	18	2	20 "	4 days	24
18	Hamilton	8	2	100	22	8	25 "	1 week	28
19	Ingersoll	5	1¼	14	20	10	20 "	5 days	9
20	Kincardine	7	1⅛	14	25	18	25 "	2 "	10
21	Kingston	6	2¼	32	20	17	20 "	1 week	25
22	Lindsay	5	1¼	20	20	20	20 "	2 days	17
23	London	8	1⅓	14	85	25	20 "	1 day	32
24	Madoc	5	1⅙	15	18	18	20 "	3 days	15
25	Meaford	4	1½	12	20	18	25 "	1 "	11
26	Milton	6	1	17	24	18	20 "	1 week	9
27	Minden	6½	1⅓	10	15	24	16 "	1 "	16
28	Mitchell	7	1¼	9	21	45	20 "	4 days	19
29	Mt. Forest	....	1⅓	17	17	3	22 "	2 "	28
30	Morrisburg	5	1½	14	15	24	22 "	1 week	24
31	Napanee	6	1⅙	9	20	22	25 "	1 day	26
32	Newmarket	6	1	12	22	18	25 "	1 week	12
33	Norwood	5	⅔	12	14	19	20 "	2 days	16
34	Orangeville	6	⅔	18	25	26	20 "	1 week	19
35	Owen Sound	4½	1	16	18	20	20 "	2 days	18
36	Parry Sound	4	3	14	20	30	20 "	1 "	21
37	Perth	6	1⅓	20	21	41	20 "	1 "	39
38	Picton	5	1	13	21	17	20 "	3 "	14
39	Port Hope	6	⅔	13	16	26	20 min.	1 week	29
40	Port Perry	6	1¼	6	20	25	20 "	5 days	20
41	Prescott	6	1	10	20	24	25 "	1 week	12
42	Renfrew	6	⅔	17	18	22	20 "	1 "	21
43	Richmond	6	1⅓ to 2	7	32	59	25 "	4 days	13
44	St. Thomas	7	1½	12	22	52	20 "	3 "	32
45	Sarnia	7	1¼	22	23	17	20 "	4 "	17
46	Simcoe	4	1¼	12	20	23	25 "	2 "	14
47	Stratford	6	1¼	60	27	14	20 "	1 week	31
48	Strathroy	6	⅔ to 1	24	28	20	20 "	4 days	17
49	Toronto	5	⅔	11	19	33	20 "	1 "	35
50	Toronto Junction	6	⅔	14	18	24	20 "	3 "	18
51	Vankleekhill	5	3	13	15	15	20 "	1 week	13
52	Walkerton	6	2¼	19	18	18	20 "	4 days	20
53	Whitby	6	1¼	18	29	15	20 "	1 week	9
54	Windsor	8	1¼	12	30	37	20 "	1 "	15
55	Woodstock	5	1	20	20	20	20 "	4 days	22
	Total	....	....	....	....	....	....	....	1,015

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MODEL SCHOOLS, 1900.—(Concluded).

Male.	Female.	Number who passed final examination. Male.	Female.	Total.	Number with Senior Leaving standing.	Number with Junior Leaving standing.	Number with Primary standing.	Number with P. S. L. standing. (District.)	Allowance made by trustees to principal's assistant.	Number of renewals granted by the board.	Average age of students.
13	19	12	18	30	3	25	4	....	$120	7	$19\frac{1}{2}$ yrs.
7	14	7	14	21	1	16	2	2	....	.....	$19\frac{3}{8}$ “
4	22	4	22	26	1	21	1	....	125	12	21 “
5	4	3	4	7	....	7	2	....	25	5	$18\frac{3}{5}$ “
2	11	2	9	11	....	4	1	8	168	22	19 “
5	13	4	13	17	....	16	....	2	125	.....	19 “
5	15	5	11	16	2	18	....	....	133	2	20 “
3	4	3	4	7	....	7	....	....	100	3	19 “
7	20	7	20	27	3	24	....	....	160	35	$19\frac{5}{8}$ “
7	16	7	16	23	7	13	3	....	96	7	$19\frac{3}{4}$ “
5	17	5	16	21	....	21	1	....	150	17	19 “
4	3	4	3	7	3	2	....	2	125	17	19 “
9	9	9	9	18	3	15	....	....	130	.....	19 “
6	9	6	9	15	....	15	....	....	125	.....	19 “
4	7	2	7	9	1	9	1	....	160	.....	$19\frac{9}{11}$ “
2	4	2	4	6	1	5	....	....	150	.....	20 “
12	12	12	12	24	1	22	1	....	150	6	$19\frac{1}{2}$ “
6	22	5	15	20	6	19	2	1	240	12	$19\frac{7}{8}$ “
2	7	2	7	9	2	6	1	....	....	.....	19 “
5	5	4	5	9	1	9	....	....	135	8	$19\frac{1}{10}$ “
9	16	9	16	25	1	24	....	....	99	13	$18\frac{1}{3}$ “
9	8	9	8	17	2	15	....	....	....	14	$18\frac{7}{10}$ “
10	22	10	22	32	6	24	2	....	†2[illegible]0	4	$19\frac{1}{6}$ “
6	9	6	9	15	....	15	....	....	140	41	$18\frac{3}{8}$ “
5	6	5	6	11	2	9	....	....	100	1	$18\frac{5}{11}$ “
3	6	3	6	9	2	6	1	....	110	6	$19\frac{2}{3}$ “
1	15	1	15	16	....	....	1	15	88	9	20 “
11	8	9	7	16	2	17	....	....	125	.....	$19\frac{1}{3}$ “
11	17	11	17	28	3	25	....	....	25	5	19 “
6	18	6	18	24	3	18	3	....	150	17	$19\frac{1}{4}$ “
2	24	2	24	26	3	11	....	12	200	10	$18\frac{7}{8}$ “
5	7	3	7	10	2	8	2	....	125	.....	19 “
6	10	6	10	16	2	13	1	....	130	.....	19 “
6	13	6	13	19	1	17	1	....	135	17	19 “
3	15	2	15	17	2	16	....	....	....	7	19 “
4	17	4	17	21	....	2	....	19	200	17	19 “
12	27	12	27	39	4	33	2	....	135	8	19 “
4	10	4	10	14	3	7	4	....	135	8	$19\frac{3}{4}$ “
8	21	8	18	26	3	23	3	....	....	22	$18\frac{1}{3}$ “
6	14	6	13	19	3	15	2	....	140	5	19 “
7	5	7	5	12	1	9	2	....	150	10	18 “
6	15	6	14	20	2	19	....	....	125	24	$18\frac{4}{7}$ “
8	5	8	5	13	2	11	....	....	150	.....	19 “
15	17	14	17	31	4	26	2	....	....	15	19 “
3	14	3	14	17	1	14	2	....	....	1	$19\frac{3}{17}$ “
7	7	5	7	12	1	11	2	....	160	8	$19\frac{3}{7}$ “
14	17	11	16	27	3	27	1	....	....	10	20 “
7	10	7	10	17	6	11	....	....	175	7	19 “
....	35	....	35	35	1	34	....	....	590	21	$19\frac{1}{3}$ “
5	13	5	13	18	4 & 1 B.A.	13	....	....	200	.....	19 “
6	7	6	7	13	....	12	1	....	130	14	20 “
6	14	6	14	20	1	19	....	....	180	10	19 “
5	4	5	4	9	3	6	....	....	125	5	19 “
7	8	7	8	15	3	11	1	....	140	8	19 “
10	12	10	12	22	2	20	....	....	....	.....	$19\frac{8}{15}$ “
346	699	327	677	1,004	114	818	52	61	....	....	19 19

†And $30 each to 8 assistants.

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APPENDIX I.—*ADMISSION OF CANDIDATES TO*

Name of school.	Entrance examination, June, 1900. Examined.	Passed.	Name of school.	Entrance examination, June, 1900. Examined.	Passed.
Alexandria	61	28	Niagara Falls South	33	31
Almonte	56	34	Norwood	75	52
Arnprior	54	36	Oakville	42	28
Arthur	37	29	Omemee	42	12
Athens	88	44	Orangeville	53	37
Aurora	41	24	Orillia	98	69
Aylmer C. I.	105	47	Oshawa	77	55
Barrie C. I.	107	69	Ottawa C. I.	318	166
Beamsville	33	24	Owen Sound C. I.	119	56
Belleville	203	103	Paris	40	28
Berlin	124	86	Parkhill	101	49
Bowmanville	51	39	Pembroke	115	60
Bradford	32	24	Perth C. I.	109	74
Brampton	73	33	Peterborough C. I.	154	97
Brantford C. I	208	164	Petrolea	105	55
Brighton	33	16	Picton	143	76
Brockville C. I.	103	76	Port Arthur	30	16
Caledonia	41	16	Port Dover	32	20
Campbellford	47	23	Port Elgin	60	32
Carleton Place	60	38	Port Hope	62	39
Cayuga	56	31	Port Perry	24	14
Chatham C. I.	114	86	Port Rowan	44	23
Clinton C. I.	57	38	Prescott	48	15
Cobourg C. I.	73	39	Renfrew	94	73
Colborne	38	28	Richmond Hill	47	30
Collingwood C. I	71	27	Ridgetown C. I.	65	33
Cornwall	87	43	Sarnia C. I.	162	86
Deseronto	51	41	Seaforth C. I	71	34
Dundas	48	36	Simcoe	108	66
Dunnville	64	49	Smith's Falls	55	36
Dutton	47	21	Smithville	26	17
Elora	33	25	Stirling	48	23
Essex	49	19	Stratford C. I.	193	121
Fergus	60	43	Strathroy C I.	159	94
Forest	44	36	Streetsville	18	10
Galt C. I.	163	100	St. Catharines C. I	137	88
Gananoque	72	27	St. Mary's C. I.	119	85
Georgetown	50	34	St. Thomas C. I.	157	72
Glencoe	83	59	Sydenham	99	49
Goderich C. I.	85	65	Thorold	37	24
Gravenhurst	56	18	Tilsonburg	65	39
Grimsby	29	25	Toronto C. I. (Harbord St.)	168	120
Guelph C. I.	154	116	" " (Jameson Ave.)	184	119
Hagersville	34	20	" " (Jarvis St.)	223	136
Hamilton C. I.	423	259	Toronto Junction	75	48
Harriston	40	26	Trenton	39	29
Hawkesbury	33	20	Uxbridge	51	29
Ingersoll C. I.	93	65	Vankleekhill	77	33
Iroquois	55	17	Vienna	35	21
Kemptville	61	32	Walkerton	64	49
Kincardine	53	37	Wardsville	25	23
Kingston C. I.	179	134	Waterdown	34	21
Leamington	62	33	Waterford	62	16
Lindsay C. I.	87	64	Watford	57	41
Listowel	61	50	Welland	40	23
London C. I	391	268	Weston	60	38
Lucan	79	43	Whitby C. I.	68	51
Madoc	80	24	Wiarton	43	26
Markham	80	57	Williamstown	40	23
Meaford	78	50	Windsor C. I.	188	83
Mitchell	64	47	Woodstock C. I.	165	125
Morrisburg C. I	108	54			
Mount Forest	59	40	Other Places.		
Napanee C. I.	150	62			
Newburgh	110	51	Aberfoyle	19	12
Newcastle	15	12	Alliston	26	18
Newmarket	55	37	Alvinston	37	22
Niagara	17	14	Ameliasburg	46	26
Niagara Falls C. I.	48	24	Amherstburg	46	16

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COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

Name of school.	Entrance examination, June, 1900. Examined.	Passed.	Name of school.	Entrance examination, June, 1900. Examined.	Passed.
Ancaster	40	24	Glen Allan	8	1
Angus	11	7	Gore Bay	16	10
Apsley	6	5	Grand Valley	24	9
Arkona	20	10	Hanover	12	11
Avonmore	35	15	Harrow	30	19
Ayr	20	18	Hastings	23	7
Bancroft	25	8	Hensall	20	11
Bath	40	18	Hepworth	24	14
Bayfield	25	11	Highgate	23	11
Belle River	28	6	Hillsdale	12	4
Beaverton	13	6	Horning's Mills	11	7
Beeton	14	14	Huntsville	20	13
Belmont	57	20	Jarvis	22	16
Binbrook	24	14	Keene	28	18
Blackstock	15	8	Kimberley	15	9
Blenheim	53	35	Kingsville	36	22
Blyth	26	18	Kintail	19	9
Bobcaygeon	19	3	Kirkfield	20	11
Bolton	25	13	Lakefield	57	31
Bothwell	23	11	Lanark	43	29
Bridgeburg	24	14	Lancaster	26	7
Bridgden	24	8	Little Britain	16	5
Bruce Mines	9	9	Little Current	5	2
Brussels	50	25	London East	184	88
Burford	23	23	Lucknow	30	16
Burk's Falls	35	22	Magnetawan	10	4
Burlington	40	20	Manitowaning	12	3
Burritt's Rapids	10	5	Markdale	31	19
Cannington	19	13	Marshville	17	8
Cardinal	18	9	Marksville	7	1
Castleton	15	3	Marysville	6	6
Charleston	29	16	Mattawa	25	11
Chatsworth	13	5	Maxville	56	22
Chesley	49	20	Merlin	21	16
Claremont	15	12	Merrickville	24	13
Clifford	11	6	Metcalfe	35	8
Comber	33	20	Midland	48	14
Cookstown	24	19	Millbrook	62	32
Courtright	16	4	Milton	83	47
Creemore	25	18	Milverton	30	23
Crediton	16	8	Minden	13	9
Crosshill	29	19	Moorefield	19	13
Cumberland	22	9	Mount Hope	24	12
Delhi	39	24	Nepigon	4	1
Delta	49	21	Newboro	40	7
Dickinson's Landing	29	14	New Hamburg	31	11
Drayton	33	17	Neustadt	6	3
Dresden	49	31	North Augusta	10	5
Drumbo	20	13	North Bay	23	20
Dryden	3	3	North Lancaster	15	4
Dundalk	20	12	Norwich	40	26
Dungannon	21	13	Oakwood	11	4
Durham	67	42	Oil Springs	29	14
Eganville	31	18	Orono	18	9
Eglington	19	15	Otterville	19	18
Elmira	17	11	Paisley	47	32
Elmvale	25	12	Pakenham	36	19
Emo River	4	3	Palmerston	23	13
Embro	36	27	Parry Sound	27	20
Erin	31	21	Pelee Island	3	1
Exeter	42	35	Pelham S. S. No. 2	35	18
Fenelon Falls	32	10	Penetangu'shene	32	19
Fingal	64	32	Plantagenet	30	20
Flesherton	29	18	Plattsville	24	14
Flinton	9	.	Port Colborne	41	29
Florence	32	16	Port Stanley	14	5
Fordwich	12	9	Princeton	26	16
Fort Frances	10	5	Powossan	19	10
Fort William	23	17	Raleigh S. S. No. 10	18	8

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APPENDIX I.—*Concluded.*

Name of school.	Entrance examination, June, 1900. Examined.	Passed.	Name of school.	Entrance examination, June, 1900. Examined.	Passed.
Randwick	6	6	Tiverton	21	9
Rat Portage	52	29	Tottenham	25	15
Richmond	63	16	Tweed	36	30
Ridgeway	30	16	Uptergrove	24	13
Ripley	17	10	Wallaceburg	57	35
Rockton	34	21	Warkworth	28	10
Rockwood	19	11	Waubaushene	26	13
Rodney	28	5	Webbwood	5	3
Rosemont	9	4	West Lorne	23	8
Russell	18	7	Westport Separate School	23	10
Sault Ste. Marie	34	28	West Winchester	114	50
Schomberg	13	7	Wheatley	18	9
Selkirk	32	16	Wilkesport	13	2
Sharbot Lake	18	9	Wingham	58	32
Shelburne	38	29	Woodbridge	19	6
South Finch	45	20	Woodville	13	4
South Mountain	39	14	Wolfe Island	22	10
Sparta	25	7	Wooler	24	19
Spencerville	23	7	Wroxeter	33	21
Springfield	25	8	Wyoming	46	24
St. George	13	12	Zephyr	20	8
St. Helen's	14	9	Zurich	28	14
Stayner	35	22			
Stoney Creek	25	15	Summary.		
Strabane	22	10			
Stroud	22	12	Collegiate Institutes	5,423	3,397
Sturgeon Falls	11	5	High Schools	5,460	3,234
Sudbury	34	12	Other Places	5,533	2,943
Sutton West	24	13			
Tara	42	24	Grand total	16,416	9,574
Tecumseth	19	6			
Teeswater	26	10			
Thamesville	42	20	Comparison with June, 1899.		
Thedford	16	10			
Thessalon	13	8			
Thornbury	46	32	Increase	107	
Tilbury Centre	29	17	Decrease	....	1,030

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APPENDIX K.—*DEPARTMENTAL LIBRARY, 1900.*

REPORT OF THE LIBRARIAN OF THE EDUCATION DEPARTMENT FOR THE YEAR 1900.

To the Honourable Richard Harcourt, M.A., Q.C., Minister of Education for Ontario.

The following is my Report of the operations of the Library of this Department for the year 1900 :

I.—THE ORDINARY BUSINESS OPERATIONS OF THE LIBRARY CONSISTS:

1. In the giving out for a specified time of books on Education and kindred subjects, which form the subjects of instruction in the Normal and Model Schools directly connected with the Department here in Toronto. These books are given out to the students of the Normal School, and various other books on a variety of subjects to teachers generally and to other persons who make special requests for particular books, in terms of the Official Regulations for the government of the Library. A record of each book thus given out is made in a Register prepared for such purpose, in which the parties borrowing sign their names in the form of a receipt and as a guarantee that they will return the book in a given time and in good order. In case of damage, the book is either paid for or a new one given in its place.

2. The selection and the purchase of books is entirely under the personal control of the Minister. In special cases only are reports on particular books required from the Librarian.

3. The binding of books, periodicals and leading newspapers is done through the Library.

4. The preparation of Catalogues, their revision and the noting down in a book all purchase of books is part of the ordinary duties of the Library.

5 Miscellaneous matters, including the furnishing of special information in regard to historical and other matters, and the examination of bills and accounts and certifying them for payment.

II.—SPECIAL RECORDS OF THE WORK OF THE LIBRARY FOR 1900.

1. *Record of the number of books given out in the year named:*

——	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Given out in month of January	159	834	375	354	578	699	608	484	526
" " February	431	764	609	804	1,010	1,870	928	868	948
" " March	617	944	585	1,034	1,270	1,702	1,393	1,158	1,454
" " April	467	897	991	627	1,021	1,111	882	848	766
" " May	546	814	694	633	843	923	969	895	911
" " June	332	461	332	354	400	609	677	518	540
" " July	69	54	47	223	32	254	265	256	231
" " August	100	97	48	100	16	184	238	329	224
" " September	526	370	344	415	295	514	410	489	432
" " October	1,263	1,148	1,010	1,130	1,170	1,200	1,013	1,018	1,312
" " November	1,136	1,004	1,039	1,063	1,268	1,099	1,024	1,034	1,229
" " December	693	559	540	597	752	704	464	549	547
	6,339	7,446	6,614	7,334	8,680	10,369	8,896	8,447	9,120

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2. *Number and subjects of the books purchased in the years 1892 1900*

Year.	Volumes.	Subjects.
1892	388	Education. Science. Literature. Text Books. Miscellaneous.
1893	290	
1894	257	
1895	430	
1896	495	
1897	476	
1898	533	
1899	315	

3 *The number of books purchased in 1900 was as follows:*

Subjects.	Volumes.
Pedagogy	23
Science	24
Philosophy and Ethics	5
Industrial and Domestic Science	23
Poetry	18
Fiction	26
Literature	78
Text Books	65
Miscellaneous	13
Total	275

4. *Number of books donated to the Library in 1898, 1899, 1900.*

—	1898.	1899.	1900.
Text Books	49	74	65
Miscellaneous	....	....	7
	49	74	72

5. *Newspapers and Magazines received at the Department, 1898-1900.*

Number of daily and weekly newspapers received during 1898 86
" " " " " " 1899 83
" " " " " " 1900 86
" magazines and other periodicals received in 1900 100

6. *Books, Magazines, etc, bound during the years 1892-1900.*

1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
79	109	136	141	98	99	90	94	37

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7. *Official Reports on Education in Different Countries received during 1896-1900.*

—	1896.	1897.	1898.	1899.	1900.
From Great Britain and Ireland	28	36	16	28	34
Various Provinces of the Dominion	29	64	61	53	22
Australasia:					
Victoria	2	1	....	1	1
New South Wales	....	1	1	1	1
South Australia	....	....	....	1	1
Western Australia	1	1	4	1	1
Queensland	1	1	1	....	....
Tasmania	1	2	1	1	....
New Zealand	13	2	1	14	8
Other British possessions:					
Mauritius	1	....	....	....	2
Cape of Good Hope	1	1	1	1	....
Natal	1	....	....	....	1
Jamaica	2	2	1	1	....
Barbados	....	1	....	....	1
British Guiana	1	1	1	1	1
Various States of the American Union	36	47	53	81	47
Miscellaneous:					
Brazil	....	....	....	....	2
Buenos Ayres	10	....	10	12	....
Montevide	11	....	6	8	....
Costa Rica	5	1	2	3	4
France	3	8	1	21	10
Germany	....	....	1	5	1
Portugal	....	....	....	1	....
Switzerland	....	3	....	2	2
Japan	1	1	1	2	1
Hawaii	....	....	1	....	....
Argentine Republic	....	13	2	....	13
Venezuela	1	....	....	....	....
Uruguay	....	13	....	....	1
Chili	....	....	....	....	1
Totals	148	199	165	238	155

8. *Various Catalogues—Printed and Unprinted.*

1. *Education.*—The catalogue of books relating to various subjects of Education and kindred subjects for the use of students, teachers and others has been reprinted. The present catalogue is a reprint, with large additions, of a catalogue of a more contracted character, printed in 1886.

2. *History of Canada.*—A supplement of the catalogue of our very extensive variety of books on the Dominion of Canada and its various Provinces, printed in 1890, was partly revised in 1899, and can be completed at any time for reprinting, when so desired. The various Historical Societies avail themselves of this collection of historical books—the members of which express themselves greatly pleased with the extent and variety of books in the collection.

3. *Miscellaneous.* As stated in my report of 1896, we have Catalogues in manuscript of (1) books on the classics and kindred subjects, (2) of works of art, and (3) of a number of rare text books, dictionaries, etc., presented to the library by the Venerable Dr. Scadding, ex-Master of Upper Canada College.

4. I would again recommend that the revised Catalogue of Books on the various Provinces of the Dominion be reprinted. At present, reference has to be made to the old Catalogue of 1890—since then we have very nearly doubled the number of Books on this most interesting subject—many of them, and especially of the new collection, of rare value. Of this older collection not less than fifty-four volumes were printed before the beginning of the nineteenth century. The Canadian part of the Library is rich in poetry written by persons in the Dominion of Canada.

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9.—*Various Kinds of Books in the Departmental Library.*

The following is a general statement of the kind of Books in the Departmental Library, viz:

Canadian History.
British History.
American Colonial History.
United States' History.
Greek and Roman History.
The Fine Arts, and Books on Design.
National Reports on Education.
Law Reports and Treatises.
Canadian Parliamentary Reports and Papers.
Colleges and Various Superior Schools in Ontario.
Teaching in Theory and Practice.
Reference Books (various).
Bound Periodicals and Newspapers.
French Books (various).
Works on Geography, including Atlases.
Natural Science.
Pedagogy and Science of Education.
Miscellaneous Books.

10.—*Historiography.*

(1) *Documentary History of Education in Upper Canada, 1791 1876.*

During this year I have completed the Seventh Volume of this History, bringing our Educational Records down to the year 1847, 1848.

I cannot better summarize the contents of this Seventh Volume of the History than in the following comprehensive words of the Rev. Dr. N. Burwash, Chancellor of Victoria University, in his reference to this Volume in *The Globe* newspaper of this City of the 15th of December, 1900:—

" This Seventh Volume . . . deals with a most important period of our educa- " tional history, and its appearance at the present moment seems most opportune. Their " is no safer guide to those who have charge of the affairs of state than to keep in view " the lessons of history, and especially the trend of its great onward movement.

" The two years covered by this Volume were especially marked by the agitation of the public mind and the conflict of parties which preceded, or accompanied, the settlement of some of our most important constitutional questions. Party feeling ran very high, and even culminated in violence; but the strife proved only to be the price at which we secured the consolidation and perfecting of "Responsible Government," the settlement of the Clergy Reserve Question, the inauguration of Municipal Institutions, and the introduction of our Public School System, followed by the nationalization of our University.

" It would be difficult to find eight years more rich in materials for our constitutional history than the period from 1846 to 1854; and the present Volume takes us right into the midst of its active movement. The fifty years that have since passed enable us to estimate with some accuracy both the significance of the movement and the value of its results. In educational matters the centre of interest lay in two points,—the introduction of Ryerson's new system of Common Schools, and the University Question. The first of these questions affected directly all classes of the population, and called forth strong expressions of public opinion from the municipal bodies of the Province. The main features of the new system were intended to secure the following improvements in the Public Schools:—

" 1. Efficient inspection, or superintendence. This was secured through District Superintendents, appointed and paid by the Municipality, then called a District, the whole system being under the direction of the Chief Superintendent of Education.

" 2. Qualified teachers. The District Superintendent was authorized to examine and license persons so qualified, and no others were recognized as Teachers.

" 3. Efficient support of the Schools. For this purpose the Provincial grant to each school was to be supplemented by an equal amount levied by assessment by the District Municipal Council. The balance of the amount required was levied by the Rate Bill, or by voluntary subscription, from those sending children to the school. The principle of free schools supported by an assessment on the property of the section was rejected by the Legislature.

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"4. Local management by the election of Trustees for each section. These Trustees were empowered, under the control of the District Municipal Council, to erect and maintain the schoolhouse at the expense of the people at large, the amount being collected by a school rate on the assessed property of the section.

"5. General attendance. This was promoted by the power given to Trustees to exempt the children of the indigent poor from the school rates . . .

"The second point of educational legislation, stirring up the conflict of parties, was the University Question. This is perhaps to us of the greatest practical interest, because we seem to be not yet at the end of the difficulty, though apparently within reach of the solution, if we hold fast that whereunto we have attained."

"The original university endowment of 1797 yielded no practical results to the country until the establishment of Upper Canada College in 1829. Even this was not the purpose contemplated by the grant. A University charter was obtained in 1827, but of a thoroughly sectarian character, and, in the next few years, the religious bodies excluded by its provisions had established schools and colleges of their own. When, finally, King's College was opened on the foundation of the Provincial endowment in 1843, two other colleges, Victoria and Queen's, were already in active operation, and Regiopolis was being founded. Then commenced a struggle to reach a truly Provincial and liberally comprehensive provision of university education for the Province, resulting in four attempts at legislation within the next eight years, (1843-1849 inclusive), the last of which alone became law. The conflict involved important political principles, which affected many other questions besides this of the university. On the one side was the liberal principle that the State should be entirely separate from the Church, and the Church independent in its support and work. On the other side was the idea that the State might supervise and assist the work of the Churches which had already taken possession of this field, or might hereafter do so, and combine their separate efforts into a Provincial University System after the model of the London University and the French University System. A minority persisted in the claim for the one church college of an exclusive right to the public endowment, and in doing so wrecked the efforts of the intermediate party, and secured the triumph of the purely secular party in 1849. The later developments of the question do not come under review at present, but the University Bills introduced by the Honourable John A. Macdonald in 1847, and defeated through the defection of the ultra church party, marks an important stage in the history of the question. The defeat of these Bills, or rather their withdrawal, opened the way for the Baldwin Act of 1849, which, notwithstanding subsequent efforts to reverse its full effect, has practically settled an important element of the question. The State endowment was henceforth for a State and non-denominational institution alone, and the complete separation of Church and State in the matter of the withdrawl of all State aid from denominational colleges became only a question of time," [and took place in 1868.]

(2) *School Room Decoration.*

Under the authority of the Minister of Education and with the sanction of the Premier, I prepared an Address, as Historiographer, on the subject of "School Room Decoration in Ontario—Historical and Patriotic" and sent a copy of it in pamphlet form to each of the Historical Societies in the Province. The pamphlet extended to 26 pages and was well illustrated with 25 pictures, descriptive of Canadian scenes and incidents. A copy of this brochure was also sent to each High and Public School Trustee Board in cities, towns and villages, and also to the Inspectors of High and Public Schools in Ontario. From none of these bodies, or individuals, has any reply been received except from Mr. Inspector Phillips of Minden.

In a memorandum on the subject which I prepared for the Minister and the Premier, I suggested that the photographs and other illustrations (named in the accompanying list) be reproduced in photograveur and published with a revised copy of the address, with a view to show what historical material we had, and available for School Room Decoration in connection with our own Dominion. In my Memorandum I further said:—

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"In addition, a few striking illustrations taken from British history (of a national and patriotic kind) might be added to our Canadian illustrations. In a letter (in response to my enquiry) received from my friend, Mr. E. Marston, of Messrs. Sampson, Low, Marston & Co., publishers, London, he suggested the following sources from which such pictures might be obtained, and said:

"I know of nothing finer than the superbly illustrated edition of Green's *Short History of the English People*; also Guizot's *History of England*. There are also several illustrations by Sir John Gilbert and Sydney Hall, and many by the best French artists. . . . From the latter work electros may be obtained. . . ."

In the collection of illustrations which I have obtained are beautifully coloured birds, etc., and other pictures, suitable for grouping purposes in schools.

I have procured the following photographs in Quebec, Montreal, Ottawa, Kingston, Toronto and Winnipeg, of statues and monuments in various parts of the Dominion. If engraved and published, as I have suggested, they would illustrate the artistic side of our historical archives.

1. The Champlain Monument, Quebec.
2. Wolfe's Monument, Plains of Abraham, Quebec.
3. Wolfe and Montcalm Monument, Quebec.
4. The First Missionary Monument, Quebec.
5. Monument aux Braves de 1760, Ste. Foye, near Quebec.
6. The Volunteers' Monument, Montreal.
7. The Maisonneuve Monument, Montreal.
8. The Macdonald Monument, Montreal.
9. The Queen Statue (Royal Victoria Hospital), Montreal
10. The Queen's Statue, Montreal.
11. The Nelson Monument, Montreal.
12. The Foot Guards' Monument, Ottawa.
13. The Cartier Monument, Ottawa.
14. The Macdonald Statue, Ottawa.
15. The Macdonald Statue, Kingston.
16. The Williams Statue, Port Hope.
17. The Ryerson Statue, Toronto.
18. The George Brown Statue, Toronto.
19. The Macdonald Statue, Toronto.
20. The Northwest Volunteers' Monument, Toronto.
21. The Volunteers' Monument, Toronto.
22. The Beaver Dam's Monument.
23. The Laura Secord Crossing.
24. Brock's Monument and Cenotaph, Queenston Heights.
25. The Brant Monument, Brantford.
26. The Lundy Lane Monument.
27. The Volunteers of the Northwest, Winnipeg.
28. The Emigrants' Monument, Grosse Isle.
29. The Young (Life Saving) Monument, St. John, N.B.
30. The Crimean Monument, Halifax.
31. The Macdonald Memorial, St. Paul's Cathedral.
32. The Marquette Monument, Wisconsin.
33. The Father Claud Allonez Monument, Wisconsin.
34. The South African Volunteers' Monument, City Hall, Toronto.
35. The Crystler's Farm Monument.

The School Room Decoration Movement in Ontario.

As an endorsement of this movement, the *Ontario Historical Society* passed the following resolution in June, 1900:

"This Society desires highly to recommend the recent address by Dr. J. George Hodgins to Canadian Historical Societies. The Society wish that as this Address has been widely circulated among Historical Societies and School Boards, it will receive the prompt consideration of each one of these influential bodies which the subject demands."

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Dr. J. R. Inch, Chief Superintendent of Education for New Brunswick. "I read your brochure with a great deal of interest. The matter with which it deals is of special importance, and I will make use of it to urge greater attention to this subject in New Brunswick than it has received in the past."

A. H. Mackay, Esq, Chief Superintendent of Education, Nova Scotia, said: "I thank you very cordially for your excellent Address on 'School Room Decoration' You are leading a very important reform. I shall call attention to the teachers to your work at the first favourable opportunity, while I endeavour to impress the necessity of improvement in this direction by legislation."

NOTE. Mr. William Dennis, Managing Director of the *Halifax Herald*, reprinted most of the Address on "School Room Decoration," with its illustrations, and sent a copy of it to every teacher in Nova Scotia. Mr. G. U. Hay, Editor of *The Educational Review* of Saint John, New Brunswick, reprinted part of the Address, with illustrations, in his magazine.

Department of Public Instruction, Quebec.

The Rev. Dr. Shaw brought before the Board, of which he was a member, the subject of "School Room Decoration." It was then resolved that the Committee cordially approves of the recommendations of Dr. Hodgins for the adornment of School Houses with suitable pictures illustrative of the history of the Empire and of the Dominion of Canada.

NOTE. The Press generally have been no less hearty in endorsing the movement, especially the Toronto *Globe*, the Montreal *Gazette* the Kingston *Whig*, the Manitoba *Free Press*, the Ottawa *Free Press*, the London *Free Press*, the London *Advertiser*, the Stratford *Beacon*, the St. Thomas *Journal*, the Port Hope *Guide*, the Welland *People's Press*, the Orillia *Packet* and the Thorold *Post*. In the official *Journal of Education*, Nova Scotia, the editor says, under date of December 13th, 1900:

"The illustrations in this pamphlet of 26 pages are good reproductions of many of the best historical pictures and scenes of Canada; and the whole work is a capital exposition of the great value of properly decorated school rooms and well-kept grounds."

Very gratifying letters of commendation of the movement have been received from the Hon. Speaker Bain and other prominent members of the Dominion House of Commons.

J. GEORGE HODGINS.

TORONTO, 21st December, 1900.

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APPENDIX L.—*TECHNICAL EDUCATION—PUBLIC AND FREE LIBRARIES, ART SCHOOLS, LITERARY AND SCIENTIFIC INSTITUTIONS, &c.*

REPORT OF S. P. MAY, ESQ., M.D., C.L.H., SUPERINTENDENT OF PUBLIC LIBRARIES, ART SCHOOLS, ETC.

SIR,—I have the honor to submit herewith my report on the Public and Free Libraries, Art Schools, and Scientific Institutions receiving a share of the Government Grant, in the Province of Ontario; as the financial year for Public Libraries which formerly ended on the 30th of April has been changed to the 31st of December, the Report of Public Libraries now submitted is for eight months only, viz., from the 1st of May to the 31st December, 1899.

At the present time there are 433 Public and Free Libraries, Art Schools, Scientific Institutions, etc., receiving Government aid, in operation in this Province.

For eight months of the year ending 31st of December, 1899, the following institutions reported:

Public Libraries (not free)	253
Public Libraries (free)	118
Art Schools, etc.	6
Scientific Institutions, etc	6
New Libraries and others which did not report before 31st of December, 1900	47
Total	433

The following Public Libraries did not report: Athens, Calabogie, Cheltenham, Coboconk, Colborne, Courtright, Emsdale, Enterprise, Gore Bay, Hastings, Hillsburg, Horning's Mills, Kearney, Melbourne, Mono College, Morewood, Ripley, Shallow Lake, St. Vincent, Trenton, Tweed, Vars, Webbwood.

The following libraries, being closed, have been taken off the official list of Public Libraries: Bishop's Mills, Chalk River, Delaware, Kimberley, Logan, Lucille, Maxville, Mayflower, New Sarum, Richard's Landing, Sudbury, Wabigoon, Walter's Falls.

The following Public Libraries have been incorporated since 1st January, 1900: Amherstburg, Bath, Bunyan, Caistorville, Cobden, Drumbo, Freelton, Haliburton, Kemptville, Madoc, Millgrove, Munster, Nairn Centre, Newbury, New Dundee, Ophir, Port Dover, Powassan, Rosseau, Sarnia, Sprucedale, Sturgeon Falls, Sunnidale (New Lowell P. O.), Wales.

I inspected the following Public and Free Libraries, Art Schools, Literary and Scientific Institutions, etc., during the year: Aberarder, Allan's Mills, Alma, Alton, Ancaster, Baden, Belleville, Berlin, Binbrook, Brampton, Brockville, Caledonia, Cannington, Carleton Place, Cayuga, Chesterville, Cobourg, Dawson, Deseronto, Drayton, Dundas, Enterprise, Forest, Garden Island, Grand Valley, Hagersville, Hamilton Art School, Hamilton Public Library, Hamilton Scientific Association, Hanover, Hespeler, Jarvis, Kars, Kingston Art School, Kingston Public Library, Kirkfield, Lindsay, London Art School, London Public Library, Markham, Merrickville, Metcalfe, Milton, Mitchell, Mono Mills, Mono Road, Nanticoke, Napanee, Napanee Mills (Strathcona P. O.), Newburgh, New Hamburg, Norwich, Norwood, Odessa, Ottawa Art School, Ottawa Field Naturalists' Club, Ottawa French Canadian Institute, Ottawa Literary and Scientific Association, Ottawa St. Patrick's Literary Association, Oxford Mills, Palmerston, Perth, Point Edward, Port Hope, Prescott, Preston, Sarnia, Shakespeare, Smith's Falls, Stratford, Tamworth, Tavistock, Unionville. Vankleekhill, Victora (Caledonia P. O.), Walkerton, Winchester, Woodbridge, Woodville, York.

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The following table shows the locality of every Public Library in the Province.

PUBLIC LIBRARIES IN 1899-1900.

Counties and Districts.	Cities, Towns and Villages.	Counties and Districts.	Cities, Towns and Villages.
Addington	Camden, East.	Dundas	Winchester.
"	Enterprise.	Durham	Bowmanville.
"	Napanee Mills.	"	Millbrook.
"	Newburg.	"	Orono.
"	Tamworth.	"	Port Hope.
Algoma	Chapleau.	Elgin	Aylmer.
"	Manitowaning.	"	Bayham.
"	Marksville.	"	Dutton.
"	Nairn Centre.	"	Port Stanley.
"	Ophir.	"	Rodney.
"	Port Arthur.	"	St. Thomas.
"	Rat Portage.	"	Shedden.
"	Sault Ste. Marie.	"	Sparta.
"	Schreiber.	"	Springfield.
"	Thessalon.	"	West Lorne.
"	Webbwood.	Essex	Amherstburg.
Brant	Brantford.	"	Comber.
"	Burford.	"	Essex.
"	Glenmorris.	"	Harrow.
"	Paris.	"	Kingsville.
"	Scotland.	"	Leamington.
"	St. George.	"	Pelee Island.
Bruce	Bervie.	"	Windsor.
"	Cargill.	Frontenac	Garden Island.
"	Chesley.	"	Kingston.
"	Hepworth.	"	Mississippi.
"	Holyrood.	Glengarry	Lancaster.
"	Kincardine.	"	Williamstown.
"	Lion's Head.	Grenville	Algonquin.
"	Lucknow.	"	Cardinal.
"	Mildmay.	"	Easton's Corners.
"	Paisley.	"	Kemptville.
"	Pinkerton.	"	Merrickville.
"	Port Elgin.	"	North Augusta.
"	Ripley.	"	Oxford Mills.
"	Riversdale.	"	Prescott.
"	Southampton.	"	Spencerville.
"	Teeswater.	Grey	Bognor.
"	Tara.	"	Chatsworth.
"	Tiverton.	"	Clarksburg.
"	Underwood.	"	Durham.
"	Walkerton.	"	Dundalk.
"	Westford.	"	Flesherton.
"	Wiarton.	"	Holland Centre.
Carleton	Carp.	"	Kemble.
"	Dawson.	"	Hanover.
"	Kars.	"	Lake Charles.
"	Kinburn.	"	Markdale.
"	Manotick.	"	Meaford.
"	Metcalfe.	"	Owen Sound.
"	Munster.	"	Shallow Lake.
"	North Gower.	"	St. Vincent.
"	Richmond.	"	Thornbury.
Dufferin	Grand Valley.	Haliburton	Haliburton.
"	Horning's Mills.	"	Minden.
"	Melancthon.	Haldimand	Caledonia.
"	Mono Centre.	"	Cayuga.
"	MonoCollege(OrangevilleP.O.)	"	Cheapside.
"	Orangeville.	"	Dufferin (Clanbrassil P.O.)
"	Primrose.	"	Dunnville.
"	Rosemont.	"	Hagersville.
"	Shelburne.	"	Jarvis.
"	Violet Hill.	"	Nanticoke.
Dundas	Chesterville.	"	Victoria.
"	Belmont.	"	York.
"	Dundela.	Halton	Acton.
"	Inkerman.	"	Burlington.
"	Iroquois.	"	Georgetown.
"	Morewood.	"	Milton.
"	Morrisburg.	"	Oakville.

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Public Libraries.

Counties and Districts.	Cities, Towns and Villages.
Hastings	Belleville.
"	Deseronto.
"	Madoc.
"	Trenton.
"	Tweed.
Huron	Auburn.
"	Blyth.
"	Brussels.
"	Clinton.
"	Dungannon.
"	Ethel.
"	Exeter.
"	Fordwich.
"	Goderich.
"	Gorrie.
"	Hensall.
"	Seaforth.
"	St. Helen's.
"	Wingham.
"	Wroxeter.
Kent	Blenheim.
"	Bothwell.
"	Chatham.
"	Dresden.
"	Duart.
"	Highgate.
"	Tilbury.
"	Tilbury, E. (Valetta P.O.)
"	Ridgetown.
"	Romney.
"	Thamesville.
"	Wallaceburg.
"	Wheatley.
Lambton	Arkona.
"	Aberarder.
"	Alvinston.
"	Bunyan.
"	Copleston.
"	Courtright.
"	Forest.
"	Oil Springs.
"	Point Edward.
"	Sarnia.
"	Thedford.
"	Watford.
"	Wyoming.
Lanark	Allan's Mills.
"	Almonte.
"	Carleton Place.
"	Dalhousie (McDonald's P.O.)
"	Lanark.
"	Pakenham.
"	Perth.
"	Smith's Falls.
Leeds	Athens.
"	Brockville.
"	Gananoque.
"	Mallorytown.
Lennox	Bath.
"	Odessa.
"	Napanee.
Lincoln	Beamsville.
"	Caistorville.
"	Grantham (St. Catharines P.O.)
"	Merritton.
"	Grimsby.
"	Niagara
Lincoln	St. Catharines.
Manitoulin I.	Gore Bay.
"	Little Current.
Middlesex	Ailsa Craig.
"	Coldstream.
"	Dorchester.
Middlesex	Glencoe.
"	London.
"	Lucan.
"	Melbourne.
"	Newbury.
"	Parkhill.
"	Strathroy.
"	Wardsville.
Muskoka	Bracebridge.
"	Gravenhurst.
"	Huntsville.
"	Port Carling.
Nipissing	Copper Cliff.
"	Haileybury.
"	North Bay.
"	Sturgeon Falls.
"	Thornloe.
Norfolk	Delhi.
"	Port Dover.
"	Port Rowan.
"	Simcoe.
"	Waterford.
Northumberland	Brighton.
"	Campbellford.
"	Cobourg.
"	Cold Springs.
"	Colborne.
"	Fenella.
"	Gore's Landing.
"	Warkworth.
Ontario	Beaverton.
"	Brooklin.
"	Brougham.
"	Cannington.
"	Claremont.
"	Oshawa.
"	Pickering.
"	Port Perry.
"	Sunderland.
"	Uxbridge.
"	Whitby.
"	Zephyr.
Oxford	Drumbo.
"	Embro.
"	Harrington.
"	Ingersoll.
"	Kintore.
"	Plattsville.
"	Norwich.
"	Otterville.
"	Princeton.
"	Tavistock.
"	Tilsonburg.
"	Thamesford.
"	Woodstock.
Parry Sound	Burk's Falls.
"	Emsdale.
"	Kearney.
"	Parry Sound.
"	Powassan.
"	Rosseau.
"	South River.
"	Sprucedale.
"	Sundridge.
"	Trout Creek.
Peel	Alton.
"	Belfountain.
"	Bolton.
"	Brampton.
"	Caledon.
"	Cheltenham.
"	Claude.
"	Forks of the Credit.

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Public Libraries.

Counties and Districts.	Cities, Towns and Villages.	Counties and Districts.	Cities, Towns and Villages.
Peel	Inglewood.	Waterloo	Berlin.
"	Mono Road.	"	Elmira.
"	Mono Mills.	"	Floradale.
"	Port Credit.	"	Galt
"	Streetsville.	"	Hawkesville.
Perth	Atwood.	"	Hespeler.
"	Listowel.	"	Linwood.
"	Milverton.	"	New Dundee.
"	Mitchell.	"	New Hamburg.
"	Monkton.	"	Preston.
"	Palmerston.	"	Waterloo.
"	Shakespeare.	"	Wellesley.
"	St. Mary's.	Welland	Bridgeburg.
"	Stratford.	"	Fonthill.
Peterborough	Hastings.	"	Fort Erie.
"	Lakefield.	"	Niagara Falls.
"	Norwood.	"	Nirgara Falls South.
"	Peterborough.	"	Port Colborne.
Prescott	Vankleekhill.	"	Ridgeway.
Prince Edward	Bloomfield.	"	Thorold.
"	Picton.	"	Welland.
Rainy River	Dryden.	Wellington	Alma.
"	Fort Francis.	"	Arthur.
Renfrew	Admaston.	"	Bellwood.
"	Arnprior.	"	Clifford.
"	Burnston.	"	Drayton.
"	Calabogie.	"	Elora.
"	Cobden.	"	Erin.
"	Douglas.	"	Ennotville.
"	Pembroke.	"	Fergus.
"	Renfrew.	"	Glen Allen.
"	White Lake.	"	Guelph.
Russell	Russell.	"	Harriston.
"	Vars.	"	Hillsburg.
Stormont	Cornwall.	"	Morriston.
"	Wales.	"	Mount Forest.
Simcoe	Alliston.	"	Rockwood.
"	Angus.	Wentworth	Ancaster.
"	Barrie.	"	Binbrook.
"	Beeton.	"	Dundas.
"	Bradford.	"	Freelton.
"	Coldwater.	"	Hamilton.
"	Collingwood.	"	Mill Grove.
"	Cookstown.	"	Lynden.
"	Creemore.	"	Waterdown.
"	Elmvale.	York	Aurora.
"	Midland.	"	Bracondale.
"	Orillia.	"	Don.
"	Penetanguishene.	"	Highland Creek.
"	Stayner.	"	Islington.
"	Sunnidale (New Lowell P.O.)	"	King.
"	Tottenham.	"	Maple.
Victoria	Bobcaygeon.	"	Markham.
"	Cambray.	"	Mount Albert.
"	Coboconk.	"	Newmarket.
"	Fenelon Falls.	"	Queensville.
"	Kinmount.	"	Richmond Hill.
"	Kirkfield.	"	Scarborough.
"	Little Britain.	"	Stouffville.
"	Lindsay.	"	Thornhill.
"	Manilla.	"	Toronto.
"	Oakwood.	"	Toronto Junction.
"	Omemee.	"	Unionville.
"	Woodville.	"	Vandorf.
Waterloo	Ayr.	"	Weston.
"	Baden.	"	Woodbridge.

The above list may be classified as follows :

Public Libraries reporting	253
Free Libraries reporting	118
Public Libraries not reporting	20
Free Libraries not reporting	3
Public Libraries incorporated since 31st December, 1899	24
Total	418

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I. PUBLIC LIBRARIES (NOT FREE).

The following extracts are taken from the annual reports for eight months of the year ending 31st December, 1899. (For details see tables A and B):

1. *Classification of Public Libraries Reporting.*

Public Libraries, with libraries, reading rooms, and evening classes..	1
" " " " and reading rooms	118
" " " " only	134
Total	253

2. *Public Libraries—Receipts and Balances on hand.*

The total receipts of Public Libraries was	$64.376 36
Balances on hand	5,338 88

3 *Public Libraries—Expenditure.*

The total expenditure of 253 Public Libraries was	$59,037 48

4 *Public Libraries—Assets and Liabilities.*

Assets of 253 Public Libraries	$373,231 38
Liabilities of 253 Public Libraries	17,845 10

5 *Number of Members in Public Libraries.*

253 Public Libraries have 31,138 members.

6. *Number of Volumes in Public Libraries and number of Volumes issued.*

Number of volumes in 253 Libraries	454,419
Number of volumes issued in 253 Libraries	506,361

7. *Reading Rooms in Public Libraries*

118 Libraries reporting have reading rooms.
11 Libraries reported having periodicals.
129 Libraries subscribed for 2,681 newspapers and periodicals.

8. *Evening Classes in Public Libraries*

One Library had 24 pupils in the drawing courses

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TABLE A.—Receipts, expenditure, etc., of Public Libraries (not free)

	Public Libraries.	Receipts. $ c.	Expenditure. $ c.	Balance on hand. $ c.	Number of members.	Number of volumes in libraries.	Number of volumes issued.	No. of newspapers and periodicals.	Number of pupils in evening class.	Assets. $ c.	Liabilities. $ c.
1	Aberardar	469 55	468 70	85	115	3,154	1,717	28	....	1,716 85	2[illegible]0 00
2	Admaston	117 88	117 01	87	162	1,054	644	....	....	460 87	....
3	Alma	116 36	109 15	7 21	103	592	449	....	....	330 40	....
4	Allan's Mills	58 99	56 35	2 64	106	363	887	....	....	302 61	....
5	Alliston	142 20	142 20	....	126	1,707	1,460	....	....	1,278 05	7 96
6	Almonte	549 01	476 91	72 10	133	3,007	2,510	32	....	3,019 68	....
7	Ancaster	166 80	152 20	14 60	120	184	73	....	....	166 60	75 00
8	Angus	45 49	45 49	....	21	400	301	....	....	195 00	....
9	Arkona	345 67	345 65	02	110	1,906	3,080	20	....	1,600 02	190 00
10	Arthur	40 97	38 95	2 02	103	2,615	1,178	19	....	1,811 17	....
11	Atwood	376 28	338 51	37 77	143	1,043	12,125	....	....	812 63	180 00
12	Auburn	346 91	346 91	....	101	799	1,444	13	..	541 33	245 00
13	Aurora	319 41	294 66	24 75	104	2,668	3,680	6	....	3,733 50	1,028 00
14	Baden	225 05	225 05	....	102	2,557	1,311	17	....	1,482 66	53 34
15	Barrie	499 14	499 14	....	155	4,242	5,624	28	....	4,625 00	215 55
16	Bayham	117 97	115 09	2 88	105	436	541	....	....	301 53	....
17	Beamsville	222 50	191 30	31 20	148	1,799	2,292	....	....	1,759 79	....
18	Beaverton	244 88	226 29	18 59	107	1,081	1,396	17	....	924 06	69 18
19	Belleville	1,416 11	1,409 28	6 83	144	4,159	6,396	29	....	3,606 83	638 69
20	Belmont	42 81	42 81	....	102	1,127	728	....	....	822 78	23
21	Belwood	169 74	169 74	....	107	939	1,040	....	....	788 81	50 00
22	Bervie	85 70	12 89	72 81	104	517	236	....	....	382 81	....
23	Binbrook	195 35	193 25	2 10	100	383	329	....	....	179 15	108 00
24	Blenheim	570 71	540 36	30 35	163	3,139	2,956	22	....	2,618 35	90 00
25	Bloomfield	290 56	290 56	....	242	1,324	6,621	27	....	1,065 64	61 17
26	Blyth	63 50	13 68	49 82	49	1,379	629	....	..	676 75	16 66
27	Bobcaygeon	345 59	179 99	165 60	110	2,146	1,762	16	....	1,866 23	....
28	Bognor	101 00	83 16	17 84	104	1,332	1,418	....	....	857 84	....
29	Bolton	240 54	240 54	....	112	2,473	5,173	19	....	2,038 24	....
30	Bowmanville	503 83	490 00	13 83	151	2,945	2,774	42	....	3,123 83	80 00
31	Bracebridge	230 45	184 79	45 66	160	2,569	3,136	23	...	2,545 66	37 50
32	Bracondale	244 83	210 66	34 17	100	548	458	....	....	341 93	125 00
33	Bradford	197 37	187 49	9 88	104	1,991	1,500	....	....	1,460 78	136 56
34	Bridgeburg	185 05	183 39	1 66	169	542	2,763	....	....	396 29	43 86
35	Brooklin	320 20	269 14	51 06	138	1,345	1,688	....	....	519 06	76 72
36	Brougham	30 00	5 00	25 00	100	315	400	....	....	327 00	....
37	Burford	270 25	248 41	21 84	117	1,278	1,737	18	...	925 84	....
38	Burlington	308 81	276 54	32 27	113	1,718	2,206	9	....	1,425 33	83 96
39	Burnstown	78 30	78 30	....	46	541	475	....	....	365 00	....
40	Cambray	193 90	131 78	62 22	105	434	422	....	....	353 67	....
41	Campbellford	242 89	238 57	4 32	168	3,655	2,953	24	..	1,929 32	102 50
42	Cannington	213 54	210 40	3 14	163	1,971	2,787	21	..	1,616 91	....
43	Cargill	193 84	191 31	2 53	101	1,041	1,425	....	....	634 91	....
44	Carp	175 34	129 00	46 34	104	845	910	....	..	628 34	....
45	Chapleau	476 73	461 36	15 37	104	1,408	1,110	28	....	4,419 20	....
46	Chatsworth	107 58	107 58	....	103	2,304	1,551	....	....	1,582 88	6 43
47	Cheapside	125 25	120 67	4 58	104	1,161	607	....	....	773 14	....
48	Claremont	189 96	149 33	40 63	102	1,821	1,314	....	....	1,304 68	....
49	Clarksburg	189 54	189 32	22	128	933	1,110	6	....	898 72	25 00
50	Claude	164 86	144 97	19 89	101	2,474	1,267	....	....	1,794 89	....
51	Cobourg	1,078 86	647 82	431 04	195	2,332	4,683	29	....	1,671 04	69 00
52	Cold Springs	249 78	231 43	18 35	113	1,012	712	....	....	898 70	180 00
53	Coldstream	134 07	134 07	....	108	1,200	1,287	25	....	612 00	....
54	Coldwater	391 20	368 31	22 89	129	1,107	1,366	20	....	710 34	175 00
55	Comber	348 21	331 28	16 93	100	1,249	2,298	22	....	866 93	....
56	Cookstown	187 50	187 50	....	103	940	985	....	....	482 75	27 52
57	Copleston	127 70	127 70	....	150	606	1,792	....	....	350 00	90 67
58	Copper Cliff	181 15	147 23	33 92	103	1,004	2,294	....	...	914 89	....
59	Dalhousie (McDonald's Corners P.O)	53 70	43 47	10 23	113	347	354	1	....	170 23	....
60	Dawson	146 79	146 79	....	150	112	103	....	....	146 79	108 29
61	Don	160 27	150 65	9 62	110	762	445	2	....	469 96	25 00
62	Dorchester	128 63	115 25	13 38	107	700	975	....	....	402 58	....
63	Douglas	119 28	119 28	....	103	696	1,037	....	....	410 39	6 34

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TABLE A.—Receipts, expenditure, etc., of Public Libraries (not free).—*Continued.*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	Number of volumes in libraries.	Number of volumes issued.	No. of newspapers and periodicals.	Number of pupils in evening classes.	Assets.	Liabilities.
	$ c.	$ c.	$ c.						$ c.	$ c.
64 Dresden	231 91	215 34	16 57	102	1,088	3,184	....	....	710 11	100 24
65 Dryden	230 96	229 82	1 14	103	523	840	13	....	250 34	23 50
66 Duart	159 20	145 90	13 30	110	2,069	2,063	....	....	1,415 07	....
67 Dufferin (Clanbrassil P.O)	125 72	125 59	13	104	1,231	615	....	....	955 41	....
68 Dundalk	192 16	190 70	1 46	140	2,852	2,462	....	....	1,651 46	....
69 Dundas	754 05	743 12	10 93	175	6,883	3,860	39	....	5,610 92	....
70 Dundella	12 00	11 68	32	157	196	856	....	....	42 53	1 85
71 Dungannon	160 55	158 25	2 30	103	1,337	1,337	15	....	698 30	10 00
72 Dunville	211 94	190 90	21 04	115	2,993	4,289	1	....	1,021 41	....
73 Durham	334 02	131 38	202 64	101	3,855	2,222	28	....	4,052 64	....
74 Easton's Corners	226 13	226 13	....	104	879	687	....	....	623 58	20 08
75 Elmira	187 47	136 13	1 34	105	2,549	1,251	18	....	1,733 65	7 33
76 Elmvale	388 29	388 29	....	101	966	1,270	15	....	448 04	243 80
77 Elora	304 96	288 51	16 45	117	8,704	4,253	22	....	8,266 45	....
78 Embro	281 00	281 00	....	102	4,464	2,454	14	.	3,733 64	12 06
79 Ennotville	163 94	129 86	34 08	52	2,418	554	....	....	1,534 08	....
80 Essex	373 61	357 82	16 29	121	2,184	1,939	22	....	2,081 86	94 9[illegible]
81 Ethel	90 98	43 80	47 18	60	1,206	471	....	....	812 44	....
82 Fenella	79 65	50 55	29 10	43	523	445	....	....	230 92	....
83 Fenelon Falls	213 67	213 67	....	108	3,183	1,623	32	....	2,419 93	95 00
84 Fergus	300 42	268 99	31 43	121	4,441	2,912	15	....	5,562 43	....
85 Flesherton	187 26	187 26	....	130	1,182	774	26	....	580 00	88 4[illegible]
86 Floradale	123 67	118 62	5 05	109	1,670	1,092	....	....	819 57	....
87 Fonthill	205 58	202 68	2 90	112	2,267	2,248	15	....	2,112 28	5 00
88 Forks of the Credit	2 25	1 90	35	71	1,246	290	....	....	860 35	....
89 Fort Erie	153 77	124 52	29 25	104	2,323	828	....	....	1,464 70	7 00
90 Fort Francis	465 40	457 87	7 53	104	488	8[illegible]8	24	....	599 53	239 92
91 Galt	646 51	592 22	54 29	322	4,462	5,803	40	24	6,304 29	....
92 Gananoque	532 18	474 24	57 94	120	2,577	6,034	23	...	2,039 81	....
93 Glen Allen	105 86	94 03	11 83	102	698	492	....	....	476 04	....
94 Glenmorris	198 98	162 58	36 40	100	2,063	729	14	....	1,611 38	....
95 Goderich	251 33	223 83	27 50	149	3,524	5,069	27	....	1,227 50	68 40
96 Gore's Landing	275 80	266 30	9 50	112	469	659	....	....	439 22	162 82
97 Grimsby	377 85	377 85	....	119	3,842	2,207	24	....	4,980 78	26 62
98 Haileybury	29 00	26 03	2 97	105	79	13	....	....	27 97	....
99 Harrington	258 40	252 01	6 39	104	594	726	....	....	361 39	65 00
100 Harriston	390 68	390 54	14	130	3,895	1,720	26	....	2,410 14	346 35
101 Harrow	184 15	76 68	107 47	181	546	2,018	....	.	441 32	....
102 Hawkesville	208 74	208 74	....	112	587	324	....	....	214 63	145 53
103 Hensall	235 52	218 64	16 88	137	1,399	1,588	....	....	976 40	100 00
104 Hepworth	127 54	127 48	06	115	819	791	30	....	466 37	....
105 Hespeler	411 25	172 79	238 46	97	2,949	2,605	22	....	2,752 01	....
106 Highgate	195 56	101 42	94 14	128	756	2,189	....	....	604 55	100 35
107 Highland Creek	83 52	82 02	1 50	105	1,487	1,064	....	....	1,173 15	....
108 Holland Centre	78 10	77 22	88	105	753	448	....	....	450 70	....
109 Holyrood	194 24	193 93	31	103	1,717	3,295	....	....	1,575 50	75 02
110 Huntsville	340 68	338 25	2 43	102	2,068	3,834	23	....	1,362 43	93 00
111 Inglewood	159 56	159 09	47	101	1,580	1,265	....	....	1,230 06	37 50
112 Inkerman	48 96	48 96	....	103	113	....	....	....	48 96	21 21
113 Islington	69 27	69 23	04	154	1,161	848	4	....	530 04	....
114 Jarvis	426 50	423 88	2 62	115	2,518	2,838	19	....	1,057 62	165 65
115 Kars	164 80	158 61	6 19	103	1,375	1,158	....	....	906 19	....
116 Kemble	58 06	49 78	8 28	107	148	330	3	..	58 06	28 25
117 Kinburn	159 27	155 41	3 86	126	1,111	1,201	....	....	644 72	28 50
118 Kincardine	283 80	279 23	4 57	179	4,226	7,032	36	....	3,709 57	286 00
119 King City	364 34	363 68	66	104	1,508	783	....	....	804 64	170 70
120 Kingston	968 29	968 29	....	213	6,189	10,546	47	....	3,100 00	400 00
121 Kinmount	277 44	268 92	8 52	101	809	1,461	....	....	643 80	94 80
122 Kintore	46 05	41 32	4 73	94	683	900	....	...	504 73	40 00
123 Kirkfield	222 66	222 66	....	103	1,302	716	15	....	440 23	87 66
124 Lake Charles	134 61	131 49	3 12	100	1,623	925	10	....	1,118 90	....
125 Linwood	22 50	20 00	2 50	25	456	....	....	....	352 50	4 00
126 Lion's Head	74 95	20 00	54 95	42	1,302	1,296	....	....	139 95	....
127 Little Britain	284 18	281 45	2 73	129	1,824	1,486	31	....	1,079 48	....

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TABLE A.—Receipts, Expenditure, etc., of Public Libraries (not free).—*Continued.*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	Number of volumes in libraries.	Number of volumes issued.	No. of newspapers and periodicals.	Number of pupils in evening classes.	Assets.	Liabilities.
	$ c.	$ c.	$ c.						$ c.	$ c.
128 Lynden	240 57	232 42	8 15	139	1,107	1,182	....	....	568 49	75 00
129 Mallorytown	196 28	177 71	18 57	103	960	1,350	....	....	557 18	159 00
130 Manilla	263 08	255 94	7 14	132	1,720	1,439	....	....	1,207 26	....
131 Manitowaning	119 07	104 27	14 80	103	787	922	....	....	416 50	45 75
132 Manotick	126 89	125 47	1 42	105	1,591	2,020	....	....	1,018 39	40 00
133 Maple	65 97	64 30	1 67	105	448	978	....	....	298 60	....
134 Markdale	481 06	460 07	20 99	152	2,243	2,263	19	....	1,999 34	35 00
135 Markham	177 88	177 01	87	139	2,783	3,326	....	....	2,020 87	40 00
136 Marksville	108 00	98 84	9 16	115	166	192	....	....	108 26	60 00
137 Meaford	257 60	228 54	29 06	114	2,319	1,647	17	....	2,664 06	2 50
138 Melancthon	127 23	127 19	04	118	503	848	....	....	241 34	6 82
139 Merrickville	275 80	264 47	11 33	179	1,745	1,988	....	....	2,211 33	147 09
140 Metcalfe	143 56	143 56	....	104	156	....	....	....	143 56	135 56
141 Mildmay	283 96	238 39	45 57	105	1,175	947	....	....	601 98	154 87
142 Milton	197 50	189 73	7 77	300	4,404	3,402	16	....	4,107 77	....
143 Minden	133 18	133 18	....	102	464	1,005	....	....	499 07	32 43
144 Mississippi	247 81	242 75	5 06	106	368	375	....	....	245 28	137 91
145 Monkton	345 25	341 86	3 39	150	691	942	....	....	438 79	175 00
146 Mono Mills	31 53	1 75	29 78	5	536	....	....	....	202 30	....
147 Mono Road	14 00	14 00	....	70	1,800	4,050	....	....	700 00	....
148 Morrisburg	227 09	227 09	....	115	2,180	3,715	25	....	1,240 00	72 49
149 Morriston	125 45	123 10	2 35	102	1,019	990	3	....	594 40	....
150 Mount Albert	236 37	236 37	....	110	479	800	....	....	304 92	34 87
151 Mount Forest	317 23	296 26	20 97	148	2,990	1,812	17	....	2,620 97	....
152 Nanticoke	251 92	239 22	12 70	130	1,390	931	....	....	904 45	117 45
153 Napanee	338 09	338 09	....	177	3,350	6,224	25	....	1,100 00	309 72
154 Napanee Mills	85 29	80 87	4 42	124	616	928	....	....	274 34	....
155 Newburgh	299 13	296 44	2 69	105	1,805	668	24	....	1,320 08	150 47
156 New Hamburg	372 46	287 52	84 94	104	2,049	1,992	16	....	1,534 94	250 00
157 Newmarket	293 22	231 70	61 52	124	1,846	2,291	....	....	1,467 60	100 00
158 Niagara	307 80	290 25	17 55	105	4,816	2,987	25	....	4,767 55	....
159 Niagara Falls	535 00	521 31	13 69	232	5,044	4,543	24	....	6,313 69	....
160 North Gower	137 90	132 89	5 01	103	1,588	1,628	....	....	825 01	....
161 Norwich	181 14	178 55	2 59	108	3,277	1,902	18	....	2,367 59	....
162 Norwood	204 16	204 16	....	57	1,733	1,963	16	....	860 00	44 40
163 Oakville	212 11	211 33	78	114	3,085	937	....	....	2,680 78	61 00
164 Oakwood	456 94	444 06	12 88	103	951	1,749	27	....	565 92	180 00
165 Odessa	150 10	149 20	90	102	589	455	13	....	320 90	65 00
166 Omemee	173 10	173 10	....	178	998	1,639	19	....	797 57	66 90
167 Orangeville	529 86	520 53	9 33	148	2,857	3,226	27	....	2,984 87	265 00
168 Orillia	463 58	431 91	31 67	147	3,623	4,337	22	....	4,104 36	265 93
169 Orono	151 67	138 30	13 37	120	1,095	1,791	....	....	966 82	19 34
170 Owen Sound	392 27	392 27	....	154	4,327	6,394	23	....	5,000 00	....
171 Oxford Mills	92 73	91 17	1 56	105	1,201	4,654	....	....	873 19	....
172 Paisley	287 34	287 34	....	209	3,749	3,161	24	....	4,248 00	53 85
173 Pakenham	139 33	135 08	4 25	70	439	710	10	....	316 92	35 90
174 Palmerston	316 47	316 47	....	251	1,474	4,199	29	....	1,150 00	280 62
175 Paris	485 12	456 86	28 26	121	6,756	3,843	35	....	11,144 76	37 50
176 Pelee Island	58 35	19 71	38 64	102	289	606	....	....	160 64	56 29
177 Pembroke	359 29	356 74	2 55	172	1,769	5,671	18	....	1,687 81	327 32
178 Perth	408 02	406 93	1 09	174	3,985	4,120	14	....	1,676 09	114 72
179 Peterborough	582 31	560 72	21 59	241	9,005	9,297	96	....	11,078 27	60 00
180 Pickering	191 24	144 88	46 36	114	1,425	1,613	13	....	1,071 36	....
181 Picton	421 90	395 66	26 24	252	2,160	4,684	19	....	1,126 24	60 00
182 Pinkerton	365 24	338 09	27 15	118	733	1,063	....	....	402 94	152 40
183 Plattsville	148 30	135 21	13 09	156	753	1,489	8	....	483 51	....
184 Point Edward	226 45	224 35	2 10	120	2,744	1,587	8	....	3,124 87	....
185 Port Arthur	334 50	334 50	....	114	1,923	7,883	18	....	1,675 00	350 00
186 Port Credit	196 85	184 89	11 96	118	1,073	856	....	....	669 02	50 00
187 Port Elgin	177 57	163 56	14 01	111	3,133	2,760	16	....	1,638 08	....
188 Port Hope	741 16	741 16	....	156	4,371	4,273	34	....	3,803 24	262 65
189 Port Perry	360 39	356 02	4 37	125	1,624	2,389	13	....	1,299 37	107 81
190 Port Stanley	185 16	183 92	1 24	108	824	1,177	....	....	682 79	....
191 Princeton	331 89	330 71	1 18	110	906	1,670	....	....	416 18	100 00
192 Preston	343 22	338 95	4 27	142	5,633	2,323	34	....	5,637 27	....
193 Queensville	129 58	127 65	1 93	110	1,721	2,191	....	....	1,058 75	55 00

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TABLE A.—Receipts, expenditure, etc., of Public Libraries (not free).—*Concluded.*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	Number of volumes in libraries.	Number of volumes issued.	No. of newspapers and periodicals.	Number of pupils in evening classes.	Assets.	Liabilities.
	$ c.	$ c	$ c.						$ c.	$ c.
194 Rat Portage	657 84	607 59	50 25	104	2,040	3,639	26	....	1,235 74	440 00
195 Richmond	160 60	158 14	2 46	102	979	920	....	....	620 13	....
196 Ridgetown	419 71	414 06	5 65	194	2,109	3,038	18	....	4,171 70	39 57
197 Riversdale	73 18	68 76	4 42	108	757	284	1	....	395 22	....
198 Rockwood	209 49	167 82	41 67	117	984	1,573	13	....	475 32	....
199 Rodney	304 32	291 20	13 12	173	598	1,320	18	....	586 18	100 00
200 Romney	240 07	198 61	41 46	101	1,750	1,088	3	....	1,353 46	7 50
201 Rosemont	210 77	209 21	1 56	120	677	1,440	....	....	441 46	179 37
202 Russell	240 73	154 38	86 35	151	1,237	1,804	27	....	1,686 35	....
203 Scarboro'	266 29	225 52	40 77	120	4,616	2,098	....	....	3,425 77	....
204 Schreiber	1,104 73	947 53	157 20	118	1,338	3,120	12	....	2,224 07	359 00
205 Scotland	236 95	206 25	30 70	125	786	1,940	25	....	518 40	....
206 Shakespeare	354 62	327 42	27 20	107	692	2,329	....	....	462 48	110 00
207 Shedden	161 27	141 08	20 19	106	860	863	....	....	471 02	153 30
208 Southampton	220 64	104 50	116 14	129	3,704	2,203	9	....	3,082 06	....
209 South River	238 75	204 05	34 68	103	532	847	....	....	703 93	193 41
210 Sparta	235 64	210 29	25 35	129	2,000	2,307	....	....	1,520 35	....
211 Spencerville	58 83	56 58	2 25	120	278	562	....	....	175 25	25 00
212 Strathroy	568 30	540 79	27 51	227	5,124	8,785	27	....	4,927 51	....
213 Streetsville	416 26	406 82	9 44	114	3,253	2,767	18	....	2,659 41	217 51
214 St. George	384 46	384 46	....	105	4,432	1,729	15	....	4,803 86	....
215 St Helen's	204 80	195 12	9 68	106	1,183	810	16	....	1,207 32	50 00
216 Sunderland	324 13	197 68	126 45	107	1,371	1,125	21	....	1,051 01	50 00
217 Tavistock	354 97	284 45	70 52	104	2,489	1,981	27	....	1,396 82	....
218 Teeswater	300 99	258 70	42 29	108	3,194	1,406	23	....	2,117 29	....
219 Thamesford	134 76	93 08	41 68	165	1,522	1,196	15	....	1,132 13	....
220 Thamesville	705 88	701 61	4 27	116	2,948	3,265	18	....	2,745 10	343 95
221 Thedford	253 00	225 46	27 54	121	1,350	2,239	....	....	900 54	....
222 Thornbury	53 61	33 12	20 49	116	778	2,380	....	....	390 49	27 00
223 Thornhill	116 41	115 90	51	103	566	477	12	....	326 60	....
224 Thornloe	50 70	50 69	01	105	160	182	....	....	80 96	....
225 Tilbury	345 14	319 82	25 32	110	1,404	1,458	23	....	996 31	105 00
226 Tilbury E., (Valetta P.O.	111 09	21 92	89 17	105	1,530	1,499	6	....	699 17	....
227 Tilsonburg	370 78	350 47	20 31	200	2,202	3,241	18	....	1,450 00	100 00
228 Tiverton	152 82	137 58	15 24	101	1,399	2,681	....	....	735 24	25 00
229 Toronto Junction	623 78	623 78	....	122	2,752	3,769	28	....	2,200 00	128 95
230 Trout Creek	219 10	219 10	....	107	681	702	....	....	441 54	172 25
231 Underwood	161 74	117 65	44 09	111	1,900	1,561	....	....	896 09	....
232 Unionville	131 58	130 73	85	111	363	1,216	....	....	226 02	....
233 Vandorf	142 53	140 80	1 73	123	1,898	480	....	....	1,501 78	1 50
234 Vankleek Hill	202 86	183 28	19 58	129	302	418	....	....	206 61	10 00
235 Violet Hill	76 86	69 61	7 25	112	768	1,273	....	...	582 25	....
236 Walkerton	315 57	292 87	22 70	159	2,350	2,990	20	....	1,890 85	....
237 Warkworth	141 65	118 96	22 69	101	921	719	21	....	561 65	105 00
238 Waterdown	107 66	107 46	20	128	1,740	1,078	....	....	650 20	22 82
239 Welland	444 31	312 43	131 88	197	3,335	4,011	28	....	4,025 88	....
240 Wellesley	230 00	208 37	21 63	165	460	175	....	....	225 70	...
241 West Lorne	200 00	199 75	25	125	829	1,256	7	....	625 25	100 00
242 Weston	282 20	279 32	2 88	110	2,829	2,338	28	....	2,252 88	102 25
243 Wheatley	226 49	219 89	6 60	105	1,094	983	....	....	993 60	125 40
244 Whitby	225 21	221 00	4 21	112	2,733	2,301	10	....	1,804 21	105 62
245 White Lake	87 21	84 21	3 00	135	483	793	....	....	193 44	....
246 Williamstown	84 40	80 04	4 36	116	766	276	....	....	951 27	40 00
247 Winchester	192 58	192 58	....	115	874	765	....	....	596 70	204 51
248 Wingham	538 85	457 93	80 92	173	2,946	2,128	46	....	2,120 92	....
249 Woodbridge	295 41	168 21	127 20	160	1,577	1,112	14	....	1,743 20	258 00
250 Woodstock	513 12	512 68	44	315	5,170	10,039	38	....	3,950 44	149 00
251 Woodville	289 64	272 84	16 80	105	1,952	1,620	29	....	1,166 80	....
252 York	172 26	168 41	3 85	104	592	568	....	....	321 75	147 91
253 Zephyr	190 19	185 19	5 00	116	571	1,049	....	...	345 43	127 77
Total	64,376 36	59,037 48	5,338 88	31,138	454,419	506,361	2,681	24	373,231 38	17,845 10

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TABLE B.—Evening Classes in Drawing in Public and Free Libraries.

Public Libraries.	Number of Students.	Primary Course.
Collingwood (Free)....	23	Freehand, Geometry, Perspective, Model and Blackboard Drawing.
Galt	5	Geometry.
Total	28	

Public Library.	Number of Students.	Advanced Course.
Collingwood (Free)....	23	Shading flat, Outline round, Shading round.
Total	23	

Public Libraries.	Number of Students.	Mechanical Course.
Collingwood (Free)....	4	Machine Drawing.
Galt	24	Descriptive Geometry, Machine Drawing, Building Construction, Architectural Design, Advanced Perspective.
Total	28	

II. PUBLIC LIBRARIES, FREE.

The following extracts are taken from the Annual Reports for eight months of the year ending 31st December, 1899 (for details see table O)

1. *Free Libraries' Receipts and Balances on hand*

The total receipts of 118 Free Libraries was...............	$114,266 51
Balances on hand....................................	9,655 16

2. *Free Libraries' Expenditure.*

The total expenditure of 118 Free Libraries was........... $104 611 35

3. *Free Libraries' Assets and Liabilities.*

Assets of 118 Free Libraries	$593,436 00
Liabilities "	125,476 71

4. *Number of Readers in Free Libraries.*

118 Free Libraries report having had 98,575 readers.

5. *Number of Volumes in Free Libraries, and Number of Volumes Issued.*

Number of volumes in 118 Free Libraries	463,603
Number of volumes issued "	1,536,543

6. *Reading Rooms in Free Libraries*

Free Libraries subscribed for 3,092 newspapers and periodicals.

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TABLE C.—Receipts and expenditure, etc., of Public Libraries (free).

	Free Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	Number of volumes in libraries.	Number of volumes issued.	Number of newspapers and periodicals.	Assets.	Liabilities.
		$ c.	$ c.	$ c.					$ c.	$ c.
1	Acton	403 93	402 90	1 03	171	1,286	3,367	....	1,469 20	....
2	Ailsa Craig	308 19	281 44	26 75	120	1,839	1,695	....	1,677 25	60 00
3	Algonquin	128 71	127 56	1 15	131	1,128	1,204	....	684 83	....
4	Alton	236 39	236 39	....	229	4,846	2,488	....	4,057 72	7 79
5	Alvinston	556 82	497 78	59 04	280	1,315	3,000	11	959 04	400 00
6	Arnprior	378 98	356 37	22 61	280	1,949	5,260	....	1,252 61	116 78
7	Aylmer	545 57	531 08	14 49	410	3,364	5,061	24	3,264 49	....
8	Ayr	236 20	225 93	10 27	289	2,966	2,628	27	1,560 27	....
9	Beeton	376 68	363 67	13 01	132	2,277	2,050	....	1,313 01	153 00
10	Belfountain	109 50	109 50		150	1,771	1,018	....	900 00	....
11	Berlin	1,086 75	1,086 75	....	726	7,456	10,389	54	7,206 11	....
12	Bothwell	325 61	256 54	69 07	300	1,400	1,928	.....	938 07	154 00
13	Brampton	725 03	484 98	240 05	398	3,897	8,513	18	2,350 05	....
14	Brantford	2,128 99	1,446 93	682 06	2,268	16,217	43,069	71	14,432 06	....
15	Brighton	287 35	287 35	...	236	2,221	2,892	19	1,065 00	....
16	Brockville	2,027 80	1,472 55	555 25	2,109	8,945	41,075	45	5,005 25	27 53
17	Brussels	379 09	379 09	....	217	2,082	3,293	22	1,041 00	....
18	Burk's Falls	543 56	539 06	4 50	282	1,285	2,338	20	859 50	....
19	Caledon	174 58	174 58	......	106	2,465	1,755	.....	1,908 10	2 53
20	Caledonia	224 00	222 00	2 00	132	1,955	3,012	...	782 00	....
21	Camden East	170 92	170 92	....	154	1,247	1,215	13	717 66	....
22	Cardinal	354 75	282 37	72 38	203	1,679	1,543	23	1,247 38	175 00
23	Carleton Place	972 40	877 09	95 31	400	3,465	15,828	17	2,395 31	....
24	Cayuga	243 66	243 66	....	146	1,171	3,230	....	600 00	28 00
25	Chatham	1,666 46	1,445 41	221 05	958	6,348	22,024	38	4,871 05	....
26	Chesley	379 09	365 38	13 71	279	1,439	5,642	28	761 71	15 00
27	Chesterville	75 13	62 63	12 50	218	658	2,800	......	504 74	....
28	Clifford	294 26	292 76	1 50	160	3,031	1,726	......	1,172 84	151 16
29	Clinton	561 30	361 30	200 00	137	3,943	3,027	22	3,425 00	....
30	Collingwood	795 77	774 39	21 88	482	4,832	7,685	37	5,330 05	....
31	Cornwall	576 48	563 19	13 29	943	2,866	9,670	34	1,924 10	620 00
32	Creemore	114 62	92 56	22 06	174	891	1,652	......	447 06	....
33	Delhi	487 27	445 91	41 36	242	1,363	2,283	20	950 04	....
34	Deseronto	658 60	496 76	161 84	847	2,578	16,736	63	2,866 79	385 00
35	Drayton	364 25	316 01	48 24	201	2,651	3,582	16	1,598 24	150 00
36	Dutton	323 11	316 63	6 48	290	1,054	2,236	14	755 34	165 00
37	Erin	148 48	138 77	9 71	168	1,631	2,502	......	1,103 76	....
38	Exeter	509 52	485 21	24 31	388	3,747	5,549	.....	2,124 31	71 63
39	Fordwich	190 65	187 75	2 90	107	1,522	1,933	......	1,030 02	....
40	Forest	617 81	609 15	8 66	566	3,622	3,042	24	2,788 66	....
41	Garden Island	927 95	562 96	364 99	186	5,027	891	34	3,164 99	....
42	Georgetown	388 50	378 89	9 61	243	2,306	4,387	27	1,959 61	50 00
43	Glencoe	281 61	278 96	2 65	405	1,724	3,396	......	833 43	....
44	Gorrie	142 18	141 07	1 11	165	1,679	1,502	......	1,294 31	....
45	Grand Valley	155 73	150 74	4 99	281	1,898	3,479	14	1,167 29	....
46	Grantham (St. Catharines P.O.)	246 37	216 95	29 42	125	1,197	1,159	......	744 42	100 00
47	Gravenhurst	181 92	154 39	27 53	539	2,037	11,003	......	1,047 48	13 66
48	Guelph	1,708 12	1,708 12	....	1,298	10,074	60,944	46	10,250 00	....
49	Hagersville	383 79	383 79	....	126	1,528	2,304	18	967 31	174 49
50	Hamilton	14,404 16	14,358 03	46 13	11,021	27,440	209,112	252	61,600 74	42,006 86
51	Hanover	137 95	135 45	2 50	133	439	2,033	....	276 08	173 00
52	Ingersoll	798 52	459 58	338 94	900	3,492	12,346	25	2,438 94	98 33
53	Iroquois	293 99	274 86	19 13	240	1,639	4,211	21	1,673 82	150 00
54	Kingsville	267 84	201 98	65 86	152	970	1,043	20	865 86	75 00
55	Lakefield	152 93	143 21	9 72	1,188	900	1,731	14	509 72	....
56	Lanark	333 67	303 80	29 87	278	1,065	2,173	16	699 73	79 22
57	Lancaster	166 77	126 77	40 00	181	2,227	1,896	5	1,265 00	....
58	Leamington	353 50	325 74	27 76	401	1,758	4,759	6	1,295 04	....
59	Lindsay	1,117 85	1,117 85	....	746	3,015	10,720	49	3,200 00	103 46
60	Listowel	369 88	323 23	46 65	525	2,381	4,861	20	1,746 65	30 43
61	Little Current	123 00	121 15	1 85	235	1,327	3,525	......	926 85	....
62	London	10,666 04	8,852 33	1,813 71	5,000	13,470	82,882	190	35,813 71	21,570 16

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TABLE O.—Receipts and expenditure, etc., of Public Libraries (free).—*Continued.*

Free Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	Number of volumes in libraries	Number of volumes issued	Number of newspapers and periodicals.	Assets.	Liabilities.
	$ c.	$ c.	$ c.					$ c.	$ c.
63 Lucan	303 50	259 36	44 14	221	2,118	6,530	......	1,919 14	110 00
64 Lucknow	271 27	271 27	....	360	2,669	8,641	......	1,200 00	109 57
65 Merritton	216 75	174 92	41 83	181	1,355	4,228	......	848 05	....
66 Midland	445 14	431 97	13 17	272	1,933	2,932	......	763 17	244 87
67 Millbrook	504 78	443 36	61 42	284	1,206	3,132	29	951 42	170 00
68 Milverton	183 95	183 95	....	178	1,290	1,531	....	838 68	111 77
69 Mitchell	271 49	271 49	....	281	3,611	4,444	22	4,640 05	....
70 Mono Centre	211 06	211 06	....	116	869	1,040	......	496 54	105 06
71 Niagara Falls S.	172 75	172 69	06	368	2,141	3,693	......	1,335 06	12 00
72 North Augusta	302 61	288 82	13 79	120	932	1,064	......	558 41	150 00
73 North Bay	256 23	237 35	18 88	270	1,676	2,776	20	1,537 29	18 75
74 Oil Springs	372 38	370 55	1 83	201	1,559	2,922	....	1,001 83	9 00
75 Oshawa	581 66	531 92	49 74	504	2,516	8,532	32	1,689 74	268 50
76 Otterville	136 56	26 23	110 33	177	432	2,098	......	378 30	100 00
77 Parkhill	197 25	177 55	19 70	314	1,770	5,220	....	1,069 70	....
78 Parry Sound	358 01	330 36	27 65	247	1,221	3,633	21	895 65	....
79 Penetanguishene	451 96	451 96	....	315	4,494	8,220	22	2,350 00	75 00
80 Port Carling	99 87	99 59	28	200	842	360	12	528 28	40 16
81 Port Colborne	155 83	153 54	2 29	300	1,624	1,667	1	1,239 30	8[illegible] 98
82 Port Rowan	85 08	81 05	1 03	225	1,650	1,485	......	1,717 16	210 08
83 Primrose	90 21	84 00	6 21	117	780	1,480	....	556 21	50 00
84 Prescott	448 89	378 36	70 53	680	4,289	8,089	24	5,060 04	25 00
85 Renfrew	251 82	241 33	10 49	328	3,170	10,525	20	3,525 49	....
86 Richmond Hill	284 21	191 28	92 93	100	2,728	2,789	29	1,992 93	50 00
87 Ridgeway	152 88	146 75	6 13	134	772	1,185	...	506 13	....
88 Sault Ste. Marie	412 52	277 82	134 70	182	1,783	1,816	17	1,259 70	....
89 Seaforth	402 07	391 18	10 89	338	3,860	5,651	15	4,010 89	100 00
90 Shelburne	415 57	402 56	13 01	196	1,885	3,328	22	1,541 12	164 78
91 Simcoe	1,229 71	1,161 58	68 13	455	5,446	5,948	36	8,068 13	....
92 Smith's Falls	876 70	821 38	55 32	575	4,101	9,188	26	1,840 32	200 00
93 Springfield	286 45	284 16	2 29	118	1,126	893	....	8 9 84	314 74
94 Stayner	126 31	125 08	1 23	178	1,303	2,165	......	838 48	10 50
95 Stouffville	262 53	262 53	....	379	3,413	4,139	29	3,830 00	4 43
96 Stratford	1,473 61	1,263 64	209 97	1,155	5,153	29,676	38	4,195 38	....
97 St. Catharines	1,930 52	1,708 17	222 35	1,735	7,103	40,211	40	6,088 18	....
98 St. Mary's	358 25	351 38	6 87	620	4,419	7,282	23	2,436 87	125 00
99 St. Thomas	1,213 35	1,095 18	118 17	1,005	7,099	12,585	45	4,968 17	....
100 Sundridge	213 21	213 21	....	122	786	1,226	15	513 23	....
101 Tamworth	130 80	130 06	74	162	864	1,388	23	426 69	23 67
102 Tara	220 22	205 13	15 09	110	1,646	1,127	18	1,825 35	....
103 Thessalon	521 78	520 90	88	279	1,413	3,010	15	756 66	297 31
104 Thorold	460 74	415 10	45 64	729	4,491	4,724	19	3,645 64	28 20
105 Toronto	34,550 84	33,566 70	984 14	39,418	112,849	546,490	882	247,979 05	54,230 98
106 Tottenham	404 80	373 61	31 19	104	2,283	3,041	.....	1,396 93	....
107 Uxbridge	550 00	550 00	....	300	5,757	10,643	29	9,200 00	124 09
108 Victoria (Caledonia P.O.)	99 50	96 65	2 85	116	1,954	1,478	......	1,415 00	....
109 Wallaceburg	537 28	496 10	41 18	375	958	4,652	19	741 18	....
110 Wardsville	92 58	62 93	29 65	68	1,151	1,113	....	771 22	....
111 Waterford	207 55	114 27	93 28	251	1,160	1,610	...	883 27	....
112 Waterloo	482 29	469 21	13 08	295	6,593	4,809	32	5,243 81	170 00
113 Watford	383 23	381 71	1 52	200	1,992	2,051	21	1,601 52	143 74
114 Westford	95 90	94 19	1 71	100	1,078	383	....	840 84	....
115 Wiarton	582 25	582 25	....	272	2,625	4,040	23	1,940 21	229 90
116 Windsor	4,222 94	2,859 37	1,363 57	1,285	8,223	27,403	56	8,479 99	....
117 Wroxeter	252 61	218 57	34 04	302	4,103	2,400	.....	3,913 2[illegible]	....
118 Wyoming	173 73	172 82	91	161	1,636	3,544	..	1,475 91	56 60
Total	114,266 51	104,611 35	9,655 16	98,575	463,603	1,536,54[illegible]	3,092	593,436 00	125,476 71

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Proportionate Number of Volumes in Public Libraries.

Libraries with less than 250 volumes.

Ancaster, Dawson, Dundela, Haileyburg, Inkerman, Kemble, Marksville, Metcalfe, Thornloe.

Libraries with over 250 and less than 500 volumes.

Allan's Mills, Angus, Bayham, Binbrook, Brougham, Cambray, Dalhousie (McDonald's Corners), Fort Francis, Gore's Landing, Hanover, Linwood, Maple, Minden, Mississippi, Mono Mills, Mount Albert, Otterville, Pakenham, Pelee Island, Spencerville, Vankleek Hill, Unionville, Wellesley, White Lake.

Libraries with over 500 and less than 1000 volumes.

Alma, Auburn, Belwood, Bervie, Bracondale, Bridgeburg, Burnstown, Carp, Chesterville, Clarksburg, Cookstown, Copleston, Creemore, Don, Dorchester, Douglas, Dryden, Easton's Corners, Elmvale, Fenella, Glen Allan, Harrington, Harrow, Hawkesville, Hepworth, Highgate, Holland Centre, Kingsville, Kinmount, Kintore, Lakefield, Mallorytown, Manitowaning, Melancthon, Monkton, Mono Centre, Napanee Mills, North Augusta, Oakwood, Odessa, Omemee, Pinkerton, Plattsville, Port Carling, Port Stanley, Primrose, Princeton, Richmond, Ridgeway, Riversdale, Rockwood, Rodney, Rosemont, Scotland, Shakespeare, Shedden, South River, Sundridge, Tamworth, Thornbury, Thornhill, Trout Creek, Violet Hill, Wallaceburg, Warkworth, West Lorne, Williamstown, Winchester, York, Zephyr.

Libraries with over 1000 and less than 1500 volumes.

Acton, Admaston, Algonquin, Alvinston, Atwood, Beaverton, Belmont, Bloomfield, Blyth, Bognor, Bothwell, Brooklin, Burford, Burk's Falls, Camden East, Cargill, Cayuga, Cheapleau, Cheapside, Chesley, Cold Springs, Coldstream, Coldwater, Comber, Copper Cliff, Delhi, Dresden, Dufferin (Clanbrassil P.O.), Dungannon, Dutton, Ethel, Flesherton, Forks of the Credit, Grantham (St. Catharines P.O.), Hensall, Highland Creek, Islington, Kars, Kinburn, Kirkfield, Lanark, Lion's Head, Little Britain, Lynden, Merritton, Millbrook, Mildmay, Milverton, Morriston, Nanticoke, Orono, Oxford Mills, Palmerston, Parry Sound, Pickering, Port Credit, Russell, Schrieber, Springfield, Stayner, St Helen's, Sunderland, Thedford, Thessalon, Tilbury, Tiverton, Wardsville, Waterford, Westford, Wheatley.

Libraries with over 1500 and less than 2000 volumes.

Ailsa Craig, Alliston, Arkona, Arnprior, Beamsville, Belfountain, Bradford, Burlington, Caledonia, Cannington, Cardinal, Claremont, Erin, Floradale, Fordwich, Glencoe, Gorrie, Grand Valley, Hagersville, Holyrood, Inglewood, Iroquois, King, Lake Charles, Leamington, Little Current, Manilla, Manotick, Merrickville, Midland, Mono Road, Newburgh, Newmarket, North Bay, North Gower, Norwood, Oil Springs, Parkhill, Pembroke, Port Arthur, Port Colborne, Port Perry, Port Rowan, Queensville, Romney, Sault Ste. Marie, Shelburne, Tara, Thamesford, Tilbury E. (Valetta P.O.) Underwood, Vandorf, Victoria (Caledonia P.O.), Waterdown, Watford, Woodbridge, Woodville, Wyoming.

Libraries with over 2000 and less than 2500 volumes.

Beeton, Bobcageon, Bolton, Brighton, Brussels, Caledon, Chatsworth, Claude, Cobourg, Duart, Dundalk, Ennotville, Essex, Fonthill, Fort Erie, Georgetown, Glenmorris, Gravenhurst, Huntsville, Lancaster, Listowel, Lucan, Markdale, Meaford, Morrisburgh, Mount Forest, New Hamburg, Niagara Falls South, Picton, Rat Portage, Ridgetown, Sparta, Tavistock, Tilsonburg, Tottenham, Walkerton.

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Libraries with over 2500 and less than 3000 volumes.

Arthur, Aurora, Ayr, Baden, Bowmanville, Bracebridge, Cornwall, Deseronto, Drayton, Dunnville; Elmira, Gananoque, Hespeler, Jarvis, Lucknow, Markham, Orangeville, Oshawa, Point Edward, Richmond Hill, Thamesville, Toronto Junction, Weston, Whitby, Wiarton, Wingham.

Libraries with over 3000 and less than 3500 volumes.

Abetarder, Almonte, Aylmer, Blenheim, Brampton, Carleton Place, Clifford, Fenelon Falls, Ingersoll, Lindsay, Napanee, Norwich, Oakville, Port Elgin, Renfrew, Stouffville, Streetsville, Teeswater, Welland.

Libraries with over 3500 and less than 4000 volumes.

Campbellford, Clinton, Durham, Exeter, Forest, Goderich, Grimsby, Harriston, Mitchell, Orillia, Paisley, Perth, Seaforth, Southampton.

Libraries with over 4000 and less than 5000 volumes.

Alton, Barrie, Belleville, Collingwood, Embro, Fergus, Galt, Kincardine, Milton Niagara, Owen Sound, Penetanguishene, Port Hope, Prescott, Scarboro', Smith's Falls, St. George, St. Mary's, Thorold, Wroxeter.

Libraries with over 5000 and less than 6000 volumes

Garden Island, Niagara Falls, Simcoe, Stratford, Strathroy, Preston, Uxbridge, Woodstock.

Libraries with over 6000 and less than 8000 volumes.

Berlin, Chatham, Dundas, Kingston, Paris, St. Thomas, Waterloo.

Libraries with over 8000 and less than 10,000 volumes.

Brockville, Elora, Peterboro, St. Catharines, Windsor.

Libraries with over 10,000 and less than 20,000 volumes.

Brantford, Guelph, London.

Library with over 20,000 and less than 30,000 volumes.

Hamilton.

Library with over 100,000 volumes

Toronto.

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III. ART SCHOOLS AND DEPARTMENTAL DRAWING EXAMINATIONS.

Tables D to H show the number of Certificates awarded from the commencement of this branch of the Education Department—1882 to 1900.

TABLE D.—Certificates awarded in Primary Art Course from 1882 to 1900.

Year.	Freehand drawing.	Geometry.	Perspective.	Model drawing.	Blackboard drawing.	Teacher's certificates.	Total.
1882..........	28	21	17	12	28	....	106
1883	84	89	58	47	76	....	354
1884.....	153	174	139	138	86	66	756
1885..........	214	529	301	168	198	122	1,532
1886..........	634	672	149	662	414	77	2,608
1887..........	643	1,204	428	444	122	103	2,944
1888	805	882	520	403	236	133	2,979
1889.	1,002	961	394	470	494	187	3,508
1890	1,000	1,009	290	811	313	130	3,553
1891	1,085	1,569	292	746	422	164	4,278
1892	1,361	1,419	569	1,120	720	338	5,527
1893	1,769	1,277	439	876	392	220	4,973
1894	1,383	719	548	550	562	153	3,915
1895	1,813	1,429	658	1,311	991	341	6,543
1896	1,195	569	361	1,110	1,121	265	4,621
1897.	716	500	212	704	516	114	2,762
1898	854	311	173	1,224	604	149	3,315
1899..........	1,062	465	168	1,128	1,170	160	4,153
1900..........	1,000	254	194	675	1,007	130	3,260
Total....	16,801	14,053	5,910	12,599	9,472	2,852	61,687

TABLE E.—Certificates Awarded in Advanced Art Course from 1883 to 1900.

Year.	Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Ornamental design.	Industrial design.	Teachers' certificates.	Total.
1883	5	5	12	18	....	....	....	40
1884....	16	5	12	12	....	....	... .	45
1885..........................	33	18	35	29	....	....	4	119
1886	35	24	19	48	....	....	3	129
1887	59	27	28	25	34	....	14	187
1888..........................	22	17	39	44	20	....	9	151
1889	65	36	58	24	25	....	14	222
1890..........................	62	30	76	43	22	....	15	248
1891..........................	80	52	67	66	38	....	23	326
1892..........................	24	32	53	72	37	....	13	231
1893..........................	58	54	73	62	54	....	13	314
1894...............	31	44	58	79	68	....	24	304
1895..........	56	52	78	58	29	....	11	284
1896	60	74	103	113	....	29	17	396
1897..........................	61	47	126	95	....	41	18	388
1898	67	73	169	187	....	44	18	558
1899..........................	61	69	152	160	....	57	22	521
1900..........................	80	55	82	119	....	31	17	384
Total.......	575	714	1,240	1,254	327	202	235	4,847

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Art School Exhibition, Hamilton, July, 1900.

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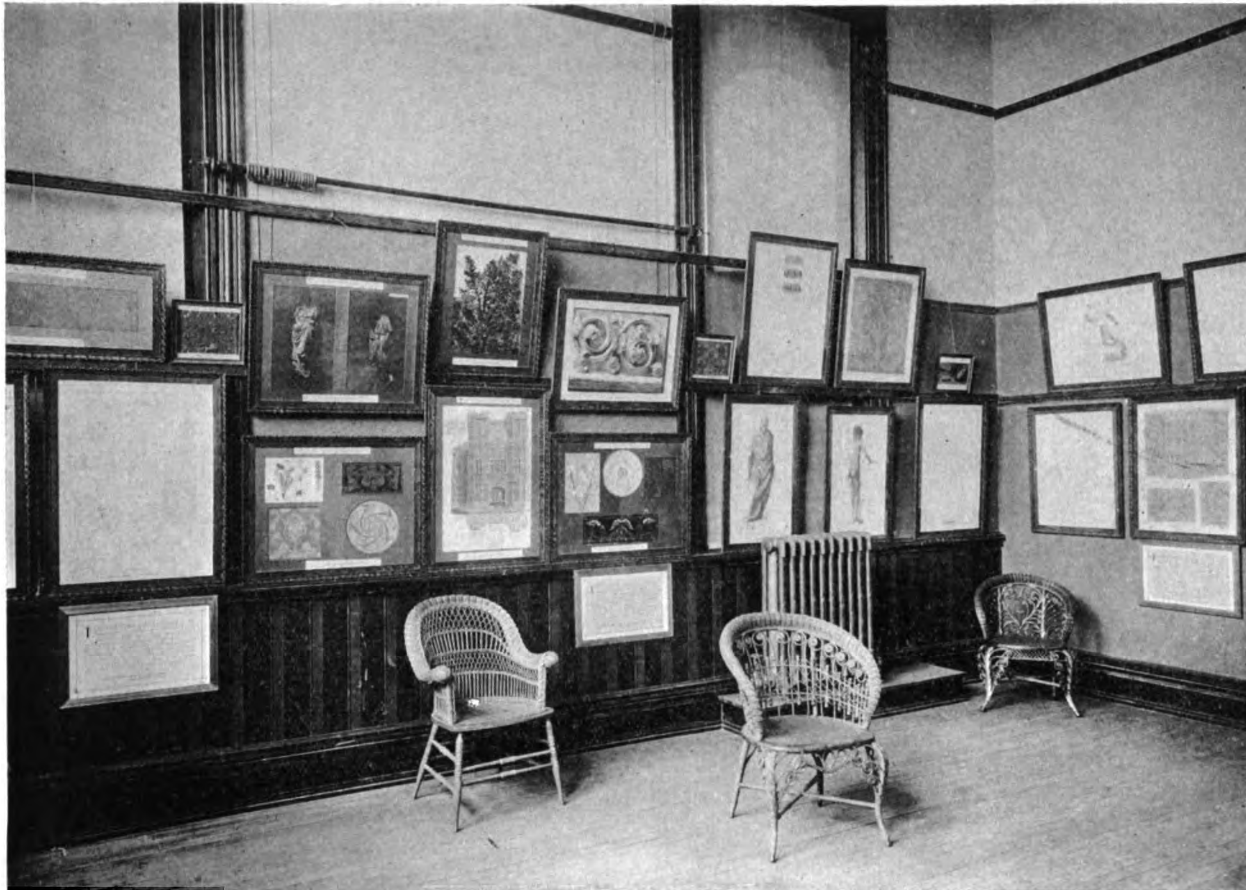

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TABLE F.—Certificates awarded in Industrial Art Course from 1885 to 1900

Year.	Modelling in clay.	Wood carving.	Wood engraving.	Lithography.	Painting on china.	Total.
1885	14	...	...	...	...	14
1886	11	7	...	...	...	18
1887	8	2	...	...	...	10
1888	10	3	1	1	9	24
1889	7	1	3	2	6	19
1890	7	4	...	1	6	18
1891	5	2	1	...	7	15
1892	2	1	...	1	3	7
1893	5	2	...	1	3	11
1894	4	2	...	2	10	18
1895	5	3	2	6	18	34
1896	3	2	...	3	30	38
1897	5	3	1	4	17	30
1898	7	5	...	1	17	30
1899	9	14	...	2	17	42
1900	17	14	...	6	6	43
Total	119	65	8	30	149	371

TABLE G.—Certificates awarded in Mechanical Drawing Course from 1883 to 1900.

Year.	Advanced geometry.	Machine drawing	Building construction.	Industrial design.	Architectural design.	Advanced perspective.	Teachers' certificates.	Total.
1883	2	3	1	2	...	3	...	11
1884	1	1	1	1	...	1	...	5
1885	12	32	4	25	...	12	4	89
1886	14	13	5	28	...	14	3	77
1887	6	5	12	18	...	6	2	49
1888	8	7	7	15	...	11	2	50
1889	13	23	11	20	...	12	3	82
1890	11	23	5	8	...	12	2	61
1891	3	31	8	31	...	28	2	103
1892	17	25	13	38	...	15	2	110
1893	14	33	10	47	...	35	10	149
1894	12	17	6	90	...	9	3	137
1895	5	22	9	31	...	12	3	82
1896	7	9	5	...	9	12	3	45
1897	16	13	4	...	6	15	...	54
1898	6	19	2	...	7	8	...	42
1899	25	20	5	...	7	18	...	75
1900	14	8	12	...	5	14	...	53
Total	186	304	120	354	34	237	39	1,274

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TABLE H.—Certificates awarded for Extra Subjects from 1885 to 1900.

Year.	Drawing from the antique.	Shading from casts.	Architectural designs.	Drawing from life.	Painting from life.	Painting oil colors.	Painting water colors.	Sepia.	Monochrome.	Pastel.	Sculpture in marble.	Photogravure.	Repousse work.	Industrial design.	Pen and ink.	Machine drawing.	Engraving on copper.	Crayon portraits.	Total.
1885	..	..	..	..	..	9	7	..	..	..	..	..	..	..	..	..	..	..	16
1886	..	..	..	..	..	12	7	..	..	..	..	..	..	..	..	..	..	..	19
1887	..	..	..	7	..	32	9	..	..	..	..	..	2	..	..	..	..	..	50
1888	..	..	..	15	12	25	14	13	1	..	2	..	2	..	..	..	..	..	84
1889	..	..	..	12	8	16	21	3	2	..	..	..	..	..	..	..	..	..	62
1890	..	..	..	7	4	28	18	10	4	..	..	..	..	..	..	..	..	..	71
1891	..	..	..	4	5	29	26	3	6	..	..	..	..	..	..	..	..	..	73
1892	..	..	..	2	6	21	16	7	1	..	..	..	..	..	..	..	..	2	55
1893	11	..	2	5	9	35	21	7	4		..	..	..	..	..	..	..	..	94
1894	11	..	2	8	6	29	16	5	7	..	..	..	..	10	..	1	..	..	95
1895	26	..	6	14	4	39	24	10	1	..	..	..	..	17	..	5	1	..	147
1896	14	..	..	12	6	34	38	6	1	2	..	1	..	13	1	1	..	..	129
1897	19	11	1	17	6	38	42	7	3	3	..	3	..	22	3	4	..	..	179
1898	22	12	..	12	9	37	28	7	6	6	1	6	..	15	4	6	..	..	171
1899	19	14	..	17	2	10	22	8	1	4	..	3	..	31	13	5	..	..	149
1900	29	30	..	13	4	17	10	12	5	5	..	3		14	10	4	..	..	156
Total	151	67	11	145	81	411	319	98	42	20	3	16	4	122	31	26	1	2	1,550

Tables I. to M. show the number of certificates awarded to Art Schools in 1900.

TABLE I.—Certificates awarded to Art Schools, 1900.—Primary Course.

Art Schools.	Number of students for examination.	Number of proficiency certificates.						Number of teachers' certificates.	Grants for certificates.
		Freehand.	Geometry.	Perspective.	Model.	Blackboard.	Total proficiency certificates.		$ c.
Hamilton	91	44	8	5	35	42	134	6	109 00
Kingston	20	1	6	3	2	1	13	2	10 00
London	15	7	1	1	7	2	18	1	13 00
St. Thomas	50	22	6	20	12	24	84	3	57 00
Toronto	63	25	5	5	24	26	85	2	50 00
Total	239	99	26	34	80	95	334	14	239 00

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TABLE J.—Certificates awarded to Art Schools, 1900.—Advanced Course.

Art Schools.	Number of students for examination.	Number of proficiency certificates.						Number of teachers' certificates.	Grants for certificates
		Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Industrial design.	Total proficiency certificates.		$ c
Hamilton	106	22	15	16	42	11	106	11	75 00
Kingston	12	2	2	6	2	1	13	1	11 00
London	16	7	5	5	7	....	24	....	16 00
St. Thomas	30	13	3	10	9	6	41	1	31 00
Toronto	72	17	18	20	23	4	82	1	53 00
Total	236	61	43	57	83	22	266	14	186 00

TABLE K.—Certificates awarded to Art Schools, 1900.—Mechanical Course.

Art Schools.	Number of students for examination.	Number of proficiency certificates.						Number of teachers' certificates.	Grants for certificates.
		Advanced geometry.	Machine drawing.	Building construction.	Architectural design.	Advanced perspective.	Total proficiency certificates.		$ c.
Hamilton	30	4	1	4	4	2	15	....	15 00
Kingston	8	....	....	1	1	....	2	....	2 00
London	10	1	1	1	....	1	4	....	2 00
St. Thomas	12	1	5	5	....	2	13	....	12 00
Toronto	8	5	....	....	....	5	10	....	10 00
Total	68	11	7	11	5	10	44	....	41 00

TABLE L.—Certificates awarded to Art Schools, 1900.—Industrial Art Course.

Art Schools.	Number of students for examination.	Number of proficiency certificates.						Grants for certificates.
		Modelling in clay.	Wood carving.	Photogravure.	Lithography.	Painting on china.	Total proficiency certificates.	$ c.
Hamilton	12	2	3	3	3	....	11	11 00
Kingston	7	2	3	....	....	3	8	8 00
London	2	2	....	....	....	....	2	2 00
St. Thomas	6	1	2	....	....	3	6	6 00
Toronto	15	7	5	....	3	....	15	15 00
Total	42	14	13	3	6	6	42	42 00

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TABLE M.—Certificates awarded to Art Schools, 1900.—Extra Subjects.

Art Schools.	Number of students for examination.	Number of certificates. Painting from life.	Painting oil colours.	Painting water colou	Monochrome.	Sepia.	Drawing from life.	Pen and ink sketches.	Shading from antique.	Shading from casts.	Industrial designs.	Machine drawing.	Total.
Hamilton	26	......	1	2	2	9	....	1	8	9	3	1	36
Kingston	5	......	1	......	....	....	....	......	......	......	......	......	1
London	3	......	......	......	....	1	2	......	1	1	......	......	5
Ottawa	2	2	......	......	....	....	2	......	......	......	......	......	4
St. Thomas	5	......	......	......	1	....	....	......	1	1	......	1	4
Toronto	39	2	6	......	....	....	9	9	19	19	10	2	76
Total	80	4	8	2	3	10	13	10	29	30	13	4	126

Tables N to R show the number of Certificates Awarded to Public Schools, High Schools, Public Libraries, Ladies' Colleges, etc., in 1900.

TABLE N.—Certificates awarded to Public and High Schools, Ladies' Colleges, etc., 1900.—Primary Course.

Name of school.	Number of students for examination.	Number of proficiency certificates. Freehand.	Geometry.	Perspective.	Model.	Black-board	Total proficiency certificates.	Number of teachers' certificates.
Arthur High School	41	34	......	......	30	36	100	......
Athens "	94	36	32	8	27	36	139	9
Belleville Albert College	16	8	1	1	4	6	20	......
" High School	49	11	6	......	15	12	44	......
Bloomfield Public School	26	6	6	......	13	10	35	......
Brockville Collegiate Institute	89	51	11	......	48	51	161	......
Deseronto High School	27	11	7	4	10	14	46	2
Hamilton Central School	87	52	17	18	28	41	156	11
" Collegiate Institute	102	42	......	......	24	33	99	......
" Queen Victoria School	29	22	20	18	20	21	101	17
" Ryerson School	55	40	......	......	29	35	104	......
London Collegiate Institute	164	97	......	......	61	100	258	......
" Mr. Peel's School	8	7	5	2	7	7	28	2
Markham High School	51	19	2	1	7	18	47	1
Morrisburgh Collegiate Institute	74	17	8	17	7	23	72	13
" Public School	24	9	......	......	5	3	17	......
Newmarket High School	22	17	6	2	7	16	48	1
Niagara Falls Collegiate Institute	54	35	7	1	21	31	95	1
Orillia Collegiate Institute	41	26	20	5	6	32	89	3
Oshawa High School	56	14	1	1	5	27	48	1
Ottawa Presbyterian Ladies' College	7	4	......	......	4	......	8	......
Perth Collegiate Institute	17	5	......	2	1	4	12	......
Peterborough High School	2	2	2	2	2	2	10	2
Picton High School	86	37	13	39	27	48	164	20
Port Dover High School	27	10	......	......	7	16	33	......
Richmond Hill High School	38	16	2	2	11	18	49	1
Stratford Loretto Academy	8	3	1	......	4	5	13	......
St. Thomas Alma College	44	30	6	5	5	6	52	3
Toronto, Dewson St. Public School	1	1	1	1	1	1	5	1
" Harbord St. Collegiate Inst.	86	47	......	......	36	67	150	......
" Havergal College	17	12	......	......	7	......	19	......
" St. Joseph's Convent	41	15	4	3	14	26	62	3
" Parkdale Public School	27	15	......	......	12	15	42	......
Uxbridge High School	19	11	3	2	9	12	37	2
Wallaceburg Public School	92	29	10	9	26	28	102	3
Whitby Collegiate Institute	54	18	20	1	10	15	64	2
Windsor " "	129	49	15	15	23	49	151	16
Woodstock " "	64	43	2	1	22	48	116	2
Total	1,868	901	228	160	595	912	2,796	116

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TABLE O.—Certificates awarded to High Schools, Ladies' Colleges, etc., 1900.—Advanced course.

Name.	Number of students for examination.	Number of proficiency certificates.						Number of teachers' certificates.
		Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Industrial design.	Total proficiency certificates.	
Belleville Albert College	12	5	2	3	5	2	17	......
" High School	50	......	......	9	5	......	14	......
Ottawa Presbyterian Ladies' College	3	2	2	2	3	1	10	......
Stratford Loretto Academy	9	2	2	1	5	......	10	......
St. Thomas Alma College	11	5	3	4	7	4	22	2
Toronto Havergal College	6	......	......	1	1	......	2	......
Whitby Collegiate Institute	4	......	......	......	......	......	......	......
Windsor " "	15	5	3	5	10	3	26	1
Total	110	19	12	25	36	9	101	3

TABLE P.—Certificates awarded to High Schools, etc., 1900.—Mechanical course.

Name.	Number of students for examination.	Number of proficiency certificates.						Number of teachers' certificates.
		Advanced geometry.	Machine drawing.	Building construction	Architectural design.	Advanced perspective.	Total proficiency certificates.	
Cornwall High School	1	......	......	......	......	......	......	......
Fort William High School	1	......	......	......	......	1	1	......
Galt Public Library	11	......	1	1	......	......	2	......
Peterboro High School	2	2	......	......	......	2	4	......
Renfrew " "	1	1	......	......	......	1	2	......
Windsor Collegiate Institute	2	......	......	......	......	......	......	......
Total	18	3	1	1	......	4	9	....

TABLE Q.—Certificates awarded Ladies' Colleges, 1900.—Industrial Art course.

Name.	Number of students for examination.	Number of certificates.		Total.
		Wood carving.	Modelling in clay.	
St. Thomas Alma College	4	1	3	4
Total	4	1	3	4

TABLE R.—Certificates awarded Ladies' Colleges, etc., 1900.—Extra subjects.

Name.	Number of students for examination.	Number of certificates.						Total.
		Painting oil colors.	Painting water colors.	Monochrome.	Sepia.	Pastel.	Industrial design.	
Belleville Albert College	8	4	3	......	......	......	......	7
Ottawa Presbyterian Ladies' College	1	......	......	......	......	......	1	1
St. Thomas Alma College	12	5	5	2	2	5	......	19
Total	21	9	8	2	2	5	1	27

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TEACHERS' FULL CERTIFICATES.

The following full certificates in the Primary and Advanced Courses were awarded in 1900:

1. Teachers' Full Certificate—Primary Course.

Name.	Address.
Males.	
Adam, George	Hamilton.
Allison, Raymond	Picton.
Aylsworth, Arthur	"
Berkley, Percy	Morrisburg.
Berney, Kenneth C	Athens.
Black, Noel	Orillia.
Blackwell, George	Toronto.
Borland, William	London.
Brodie, Arthur	Hamilton.
Burke, Joseph	London.
Campbell, Kenneth C	Windsor.
Carter, F	St. Thomas.
Chad, Arthur	Picton.
Cheley, Garnet	Morrisburg.
Cody, Wm. M	Windsor.
Cook, George	Morrisburg.
Cousins, Edwin E	Wallaceburg.
Cruckshank, Wm. D	Hamilton.
Dallyn, Wm	"
Darling, Maurice	Windsor.
Dawson, Wm	Hamilton.
Dickenson, J. A	London.
Dowsley, Wm. C	Athens.
Dwight, Herbert	Picton.
Ellis, Richard J	Athens.
Fero, Bert	St. Thomas.
Foster, Wm. J	Windsor.
Galloway, Ernest	Hamilton.
Gillespie, Peter	Peterboro'.
Girardot, Henry	Windsor.
Green, Peter	Orillia.
Grey, Clarence	Athens.
Hackner, Wesley	Uxbridge.
Hare, Herbert	Picton.
Holland, Arthur	Oshawa.
King, James F	Niagara Falls.
Lawson, Gordon	Athens.
Lee, Arthur M	"
Lennox, Albert	Orillia.
Logan, Ralph	Morrisburg.
Malcolm, Leon	Hamilton.
Mallen, Kenneth	Morrisburg.
Maxwell, W. A	Windsor.
May, Roy	St. Thomas.
Milne, J. W	Toronto.
McDonald, Simon	Windsor.
McDowell, Lawrence	"
McLaughlin, Robt	Morrisburg.
McMullen, Ralph	Picton.
Parke, Roy W	Hamilton.
Pigott, Joseph	"
Pinkerton, Walter E	Athens.
Purser, Ralph	Windsor.
Rannie, Leslie	Newmarket.
Riddel, Arthur G	Hamilton.
Robinson, Mahlon	Morrisburg.
Robbins, A	Hamilton.
Shaw, E. Wilfred	Wallaceburg.
Snider, Percy R	Deseronto.
Soper, David	Morrisburg.
Sorsoleil, Milton A	Peterboro'.
Sullivan, Archie	Picton.
Turnbull, Andrew	Windsor.
Uglow, Lawrence	Kingston.
Urry, Ernest	Hamilton
Wagar, Elias E	Deseronto.
Walker, Melvin	Athens.
White, Fred. G	Hamilton.
Williams, Merton	Picton.
Williams, Thomas	"
Woon, Ethelbert	Hamilton.
Females.	
Anderson, Mary J	Hamilton.
Archibald, Nellie	"
Athawes, May	"
Batton, Edith	Picton.
Bews, Nellie	Hamilton.
Buckbee, Ella	"
Carr, Mabel	"
Church, Emily	Toronto.
Correll, Edith	Whitby.
Doherty, Mabel	Hamilton.
Duncan, Mirine	"
Dwight, Edith	Picton.
Ferrier, Ethel	Kingston.
Fetterley, Fannie	Morrisburg.
Flanagan, Mary	Toronto.
German, Marcia	Picton.
Gilmour, Maud	"
Gow, Janet	Windsor.
Gould, Alma M	Uxbridge.
Grant, Ethel	Toronto.
Grant, Fern	Wallaceburg.
Grant, Lucy P	St. Thomas.
Greenlees, Elva	Picton.
Halladay, Cora	Athens.
Hehn, Eva Caroline	Windsor.
Jaffray, Mary	Toronto.
Keeler, C. M	St. Thomas.
Kilvington, Clara	Hamilton.
LaForge, Carrie	Windsor.
Long, Annie L	Hamilton.
Lowe, Bessie	"
Mathews, Evadna	Picton.
Meyer, Marie A. L	Windsor.
Mitchell, Johanna	Hamilton.
Morgan, Jessie	Morrisburg.
McAmmond, Luella	"
McIntosh, Aggie	"
McIntosh, Bertha	Woodstock.
McKay, Mabel	"
McMichael, Elsie	Hamilton.
Nicholson, Edith K	"
Peck, Ruth	Windsor.
Phifer, Ethel	Morrisburg.
Platt, Louise	Picton.
Richardson, May	Whitby.
Ringer, May	Picton.
Risebough, Hattie	Richmond Hill.
Rourke, Mabel	Picton.
Seaton, Willa	Hamilton.
Small, Elizabeth	"
Soper, Florence A	"
Sprague, Evaline May	Windsor.
VanDusen, Ethelwyn	Picton.
Walker, Margaret	Hamilton.
Watterworth, Grace McC	"
Webster, Bertha	"
Williams, Rose	Picton.
Windsor, Annie	Markham.
Wrenshall, Alice C	St. Thomas.

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2. Teachers' Full Certificates—Advanced Course.

Name.	Address.	Name.	Address.
Banker, Grace E	Windsor.	Hutchison, Maud	Toronto.
Coleman, Wm	Hamilton.	Jones, Kate	St. Thomas.
Colquhoun, Emily E	"	Lemon, Helen	Hamilton.
Corson, Florence Alberta	"	Long, Annie L	"
Ferrier, Ethel	Kingston.	Pigott, Joseph M	"
Fletcher, Margaret	Hamilton.	Smith, Bessie A	"
Fraser, Margaret	"	Thomson, Jessie	"
Grant, Lucy P	St. Thomas.	Wrenshall, Alice C	St. Thomas.
Hazell, Frank	Hamilton.		

Gold, Silver and Bronze Medals Awarded in 1900.

The following medals and special certificates were awarded for the year ending 30th April, 1900.

Gold Medal.

Presented by the Minister of Education for Advanced Course:—Original and industrial designs and drawings from the antique, Agnes Keating, Toronto Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best original industrial design, Carmen Maynard, Toronto Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best Machine Drawing from models, John Angold, Hamilton Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best original drawings in building construction or architecture, W. P. Coleman, Hamilton Art School.

Bronze Medals.

For the best painting from life, Lily Stratton, Ottawa Art School.

For the best specimen of painting (oil colors), M. W. Robertson, Toronto Art School.

For the best specimen of painting (water colors), Mary Morton, Belleville Albert College.

For the best specimen of china painting, Miss E. Bevitt, St. Thomas Art School.

For the best drawing from life, Minnie Middleton, Toronto Art School.

For the best specimen of pen and ink drawing, Minnie Middleton, Toronto Art School.

For the best specimen of lithography, Wm. Taylor, Hamilton Art School.

For the best specimen of wood carving, Mrs. E. Hewett, Hamilton Art School.

For the best specimen of modelling in clay, E. E Baker, Kingston Art School.

For the highest number of marks in Primary Art Course (Art Schools), J. W. Milne, Toronto Art School.

For the highest number of marks in Primary Art Course (Ladies' Colleges), Alice C. Wrenshall, St. Thomas Alma College.

For the highest number of marks, Primary Art Course (High Schoo s and Collegiate Institutes), Ralph McMullen, Picton High School.

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For the highest number of marks, Primary Art Course (Public Schools), George Adam, Hamilton Central School.

EXAMINATION PAPERS.

The total number of examination papers sent out in 1900 was as follows:

Primary Course.

Freehand	1,279	
Geometry	660	
Perspective	588	
Model Drawing	1,238	
Blackboard Drawing	1,250	
		5,015

Advanced Course.

Shading, flat	194	
Outline, round	147	
Shading, round	264	
Flower Drawing	240	
Industrial design	106	
Competition for gold medal	5	
		956

Mechanical Course.

Advanced Geometry	63	
Machine Drawing	68	
Building Construction	45	
Architectural Design	11	
Advanced perspective	49	
		236
Total		6,207

ART SCHOOLS, ETC.—REPORTS FOR YEAR ENDING 30TH APRIL, 1900.

1.—*Hamilton Art School.*

The report of the Hamilton Art School for the year ending 30th April, 1900, shows that 119 students attended the primary course, 92 in the advanced course, 48 in the mechanical course, 43 in the industrial art course and 36 in extra subjects, including painting in oil and water colors, etc.

The students in attendance represented the following trades and professions, viz.—Architects, artists, brassworkers, brushmakers, builders, contractors, cotton operatives, cabinetmakers, clerks, carpenters, carvers, draughtsmen, dressmakers, engineers, elevator makers, embroiderers, gardeners, gasfitters, lithographers, milliners, machinists, moulders, painters, paperhangers, photographers, printers, school-boys, school-girls, students, stenographers, signpainters, tailors, teachers, woodturners, tinworkers, ticketwriters.

The receipts, including the Government grant, were $2,659.55; expenditure, $2,-582.18; balance on hand, $77.37.

2.—*Kingston Art School.*

The report of the Kingston Art School for the year ending 30th April, 1900, shows that 23 students attended one or more subjects in the primary course, 14 one or more

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subjects in the advanced course, 12 one or more subjects in the mechanical course, 12 one or more subjects in the industrial art course, and 12 in oil and water colors.

The students in attendance represented the following trades and professions, viz.—Blacksmiths, carpenters, cabinetmakers, clerks, druggists, farmers, millers, machinists.

Receipts, including the Government grant, $578.00 ; expenditure, $573.95 ; balance on hand, $4 05.

3.—*London Art School.*

The report of the London Art School for the year ending 30th April, 1900, shows that 55 students attended one or more subjects in the primary course, 57 one or more subjects in the advanced course, 15 one or more subjects in the mechanical course, 22 one or more subjects in the industrial art course, and 19 in oil and water colors, etc.

The students in attendance represented the following trades and professions, viz.—Artists, architects, carpenters, china decorators, draughtsmen, dressmakers, enamellers, electricians, granitecutters, housekeepers, insurance agents, lithographers, marblecutters, machinists, painters, patternmakers, plasterers, photographers, students, teachers.

Receipts, including Government grant, $; expenditure, $; balance on hand, $.

4.—*St. Thomas Art School.*

The report of the St. Thomas Art School for the year ending 30th April, 1900, shows that 50 students attended one or more subjects in the primary course, 29 one or more subjects in the advanced coutse, 25 one or more subjects in the mechanical course, and 22 in one or more subjects in the industrial art course.

The students in attendance represented the following trades and professions, viz.—Boilermakers, bookkeepers, clerks, carpenters, insurance agents, masons, moulders, students and teachers.

This school is incorporated with the St. Thomas Free Library, which contributes toward its maintenance. The receipts and expenditures are included in the report of the St. Thomas Free Library.

5.—*Toronto Art School.*

The report of the Toronto Art School for the year ending 30th April, 1900, shows that 42 students attended one or more subjects in the primary course, 91 one or more subjects in the advanced course, 8 one or more subjects in the mechanical course, 23 one or more in the industrial art course, and 51 in oil and water colors, etc.

The students in attendance represented the following trades and professions, viz.—Artists, architects, bookkeepers, clerks, cabinetmakers, designers, decorators, draughtsmen, engravers, electricians, expressmen, gilders, glass stainers, illustrators, lithographers, machinists, photographers, photogravures, patternmakers, stonecutters, students, sign writers, teachers, woodcarvers.

Receipts, including Government grant, $3,173.45 ; expenditure, $3,005.43 ; balance on hand, $168.02.

6.—*Ontario Society of Artists.*

The report of the Ontario Society of Artists for the year ending 30th of April, 1900, shows that at the Industrial Exhibition held in Toronto in 1900, 274 pictures were exhibited under the control of the society.

At the twenty eighth annual exhibition in their art gallery, 183 pictures, by sixty exhibitors, were hung.

The two works, selected by the Society, for the Provincial Art Gallery were "On the River Road," Laura Muntz, and "When the Lights are Low," F. S. Challener.

Receipts, including Government grant, were $4,490.27 ; expenditure, $2,830.92 ; balance on hand, $1,659.35.

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7.—*Provincial Art Gallery and Educational Museum.*

In 1895 the Act made provision that out of the Government grant of $500.00 to the Ontario Society of Artists, two pictures to the value of $200.00 shall be purchased annually to become the property of the Education Department for the Provincial Art Gallery. In 1897 the Minister of Education entered into an agreement with the Society, that provided it would keep one of the large galleries in the Educational Museum filled with the recent work of its members, that pictures would be purchased annually for the Provincial Art Gallery to the amount of $800.00.

The following is a list of paintings purchased by the Education Department, from the members of the Ontario Society of Artists, up to the end of the year 1900:

Paintings for Provincial Art Gallery.

Atkinson, W. E.—Evening; Winter in Holland.
Bell-Smith, F. M.—Island Park; Westminster Bridge.
Blatchly, W. D.—A Quiet Pool; Spring on the Hill; In the Woods.
Carlyle, Florence.—The Rose Birthday.
Challener, F. S.—The Milk Maid; Low Lights; Fireside Fancies.
Coleman, A. P.—Farm, St. Lawrence River.
Cutts, W.—Coast of Dorset.
Gagen, R. F.—When the Tide is Low; Magog's Hills.
Hagarty, Clara S—Luxumbourg Gardens.
Knowles, F. McG.—Notre Dame; Pool of London.
Manly, C. M.—Dartmoor; Stour at Canterbury; A Water Gate.
Matthews, M.—Tops of Mount Stephen.
Martin, T.—Road through the Beeches.
Martin, H.—Holy Cross Abbey.
Muntz, Laura.—In the Sunlight; On the River (Holland).
O'Brien, L. R.—Camping Out; Gathering Hay.
Reid, G. A.—The Berry Pickers; Reading.
Reid, Mary H.—A Poppy Garden; Roses.
Rolph, J. T.—Humber River.
Sherwood, W. A.—The Gold Prospector.
Spurr, G. E.—A Surry Heath; A Mill, Redhill.
Staples, O. P.—Changing Pasture.
Tully, S. S.—At the Loom; Monday Morning; Jeanne.
Verner, F. A.—Sunset.

Fine Arts Department, Educational Museum.

A collection of works executed by Art Students in different Schools of Art in the United Kingdom, representative of the subjects of instruction for which grants in aid are made by the Science and Art Department, South Kensington, London, England, and which gained awards at the National Competition, selected by the Lords of the Committee of Council on Education, secured through the efforts of the Hon. the High Commissioner of Canada, has been secured for the Educational Museum during the year. *Art Schools Represented*: Royal College of Art, Ashton-under-Lyne, Bradford, Bristol, Coalbrookdale, Dover, Heywood, Grantham, Lancaster, Manchester, Marylebone, Plymouth, Redditch, St. Albans, St. Pancras, Southampton, Widnes, Worcester. *Drawings and Paintings*: Geometrical drawing, freehand drawing from the cast, model drawing, shading from the cast, perspective, architecture, plant drawing, flower and tree designs, design in outline, drawing from the antique, study of drapery, painting ornament in monochrome, group in water colors, historic styles in ornament, ornamental design, drawing from the nude, study of drapery, painting figure from the nude, architectural drawing from measurement, time sketches from life. *Modelling*: Modelling ornament from the cast, figure from antique, fruits, etc., from nature, design, anatomical studies, the human figure from the nude, human figure in relief.

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8. *Provincial Art School Exhibitions.*

An Industrial Art School Exhibition was held at the Hamilton Art School from the 10th to 19th of July. In addition to the students' work, the paintings, drawings, etc., belonging to the Education Department were exhibited. The exhibition was a great success.

The pictures, drawings, etc., were subsequently exhibited at Ottawa.

LITERARY AND SCIENTIFIC INSTITUTIONS.

1. *Hamilton Literary and Scientific Association.*

The report of the Hamilton Literary and Scientific Association for the year ending 30th April, 1900, shows that the high character of the work of former years has been fully maintained. During the year four meetings of the Council were held, also, seven of the general association, and twenty-four meetings of sections, at which papers were read and discussed on history, fine arts, geology, biology, etc.

Additions have been made to the biological and geological sections of the museum.

Specimens have been presented to the British museum, Washington museum, Dublin museum and other museums, including Ottawa and Montreal.

The receipts, including Government grant, were $671.35; expenditure, $458.05; balance on hand, $213.30.

2. *Kingston School of Mining and Agriculture.*

The report of the Kingston School of Mining and Agriculture for the year ending 30th April, 1900, shows that the number of students in attendance was as follows: Mining Engineering (degree course) 50; Mining Engineering (prospectors' course) 6; other Engineering courses 12; other courses 146; total 214.

The improvements in the mining laboratory have greatly facilitated practical instruction in ore dressing. Several commercial tests for gold and copper have been made during the year.

Cheese-making and butter-making, dairy school branch, 106 students registered.

Receipts, including Government grant, $17,745 89; expenditure, $17,745.89.

3. *Ottawa Literary and Scientific Society.*

The report of the Ottawa Literary and Scientific Society for the year ending 30th April, 1900, shows that the past year has been one of the most vigorous as well as one of the most prosperous experienced. The receipts from membership fees were $672. Fourteen lectures on history, literature and science were given during the session.

The reading-room contains daily and weekly newspapers, and Canadian, English and American reviews and magazines in various branches of literature, science and art, which cost $153.

The library, exclusive of reports, transactions, etc., received from kindred associations, has been increased with 205 volumes, and 6,073 volumes have been issued.

As there is no public library in Ottawa this library is well patronized.

The Social Science Club is now in affiliation with this society.

The receipts, including Government grant, were $1,259 78; expenditure, $1,164 36; balance, $95.42.

4. *Institut Canadien Francais d'Ottawa.*

The report of the Institut Canadien Francais d'Ottawa for the year ending 30th April, 1900, shows that the following courses of instruction were given during the session by eminent professors and other distinguished men.

Literary course on Canadian history, etc. eight lectures. These "Soirees de Famille" were largely attended and greatly appreciated. The lectures were accompanied by vocal and instrumental music, etc.

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Musical Course: The L'Orpheon Canadien Francais was attended by about fifty members.

Fencing Class: This class was attended by about sixty members, who while learning the sword exercise developed their physical strength, suppleness of movement, steadiness of their eyes, etc.

The library and reading-room have been largely increased during the year by purchase and contributions from scientific societies in Europe and America.

The receipts, including Government grant, were $1,082.05; expenditure, $1.655.27; deficit, $573.22.

5. *St. Patrick's Literary and Scientific Association.*

The report of St. Patrick's Literary and Scientific Association for the year ending 30th April, 1900, shows that $2,378.30 was expended during the year. The library, which was largely augmented during the year, contains 984 books on the following subjects: History, biography, voyages and travel, science and art, general literature, poetry and the drama, religious literature, fiction, miscellaneous, works of reference. The reading room is supplied with 11 daily and weekly newspapers and 6 periodicals. One hundred and twenty-five members availed themselves of the privileges of the library, etc., during the year.

The receipts, including Government grant, were $2,378 50; expenditure, $2 317.99; balance on hand, $60.81.

6. *Ontario Historical Society.*

The report of the Ontario Historical Society for the year ending 30th April, 1900, shows that the membership has greatly increased in the following affiliated societies, viz.: Belleville and Bay of Quinte Historical Society, Elgin Historical Society, Grenville Pioneer and Historical Society, Halton Historical Society, Lambton Historical Society, Lundy's Lane Historical Society, Niagara Historical Society, Niagara Falls U. E. Loyalists' Association, Oxford Historical Society, Perth Historical Society, Simcoe Pioneer and Historical Society, Women's Canadian Historical Society of Toronto, Women's Canadian Society of Ottawa, Women's Wentworth Historical Society, Wentworth Pioneer and Historical Society, Thorold and Beaverdam's Historical Society, York Pioneer and Historical Society.

During the year the society has issued volumes II and III of its Papers and Records.

7. *Ottawa Field Naturalists' Club.*

The report of the Ottawa Field Naturalists' Club for the year ending 30th April, 1900, shows that it has 300 members. The club's work lay chiefly in the direction of researches in geology, botany, entomology, ornithology, conchology, general zoology and archæology. Three general excursions and nine weekly sub-excursions were held, and Monday afternoon lectures given on the following subjects: Geology, ornithology, entomology, conchology, botany, zoology, forest trees

A course of eight lectures and entertainments were given during the winter season, viz.: Inaugural address and conversazione; meeting for the exhibition of specimens, including papers and lantern slide illustrations; electric currents of high potential and high frequency; microscopical soiree, reports of council, etc.

Fifteen volumes of the "transactions" of the Club have already been issued.

8. *Canadian Institute, Toronto.*

The report of the Canadian Institute, Toronto, for the year ending 30th April, 1900, shows that twenty-two ordinary meetings were held during the year, at which twenty-two papers were read on the following subjects, viz.: Geology, mineralogy, forestry, colour photography, biology, ethnology, botany, history, topography, etc.

The Biological section held 11 meetings at which 11 papers were read on botany, entomology, ornithology and kindred subjects.

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The Institute has during the past year received 2,297 exchanges from about 470 learned societies in different parts of the world.

Periodicals and books taken out by members, 739.

Publications during the year, Parts 2 and 3 of volume 2 of the Proceedings.

The Memorial Volume is nearly ready for distribution to members and correspondents of the Institute.

Receipts, including Government grant, $4,116.98; expenditure, $3,600.44; balance on hand, $516.54.

9. *Astronomical and Physical Society of Toronto.*

The report of the Astronomical and Physical Society of Toronto for the year ending 30th April, 1900, shows that it has 3 life members, 12 honorary members, 18 corresponding members, 74 active members and 14 associate members.

Twenty-five meetings were held during the year at which a large number of papers were read and discussed, these are published in the transactions of the Society, which also contains an address by Arthur Harvey, F.R.S.C., on Astronomy in Infancy, Youth and Maturity; an illustrated paper by John A. Patterson, M.A., on Oceanic Tides and Tidal Phenomena as revealed in the Genesis of Worlds; transactions of the Meaford Astronomical Society.

The receipts, including Government grant, were $463.58; expenditure, $430.80; balance, $32.78.

APPENDIX M.—*CERTIFICATES, ETC.*

1. Inspectors' Certificates Issued in 1900.

Cook, Henry Francis, B.A.
Chenay, David.
Denyes, James Malcolm, B.A.
Emery, John W.
Edwards, Clarence Bartlette, B.A.
Fraser, Charles McLean, B.A.
Foik, Henry John.
Husband, Almeron Judson, B.A.
Houston, William, M.A.
Libby, Minnie Fennessy, B.A.
Langford, Thomas Eli, M.A.
McLean, Allan Edmund, B.A.
McDougall, James Brown, B.A.
Rush, Myron Leslie, B.A.
Sills, William Ryerson, M.A.
Scovell, Holland R., B.A.
Taylor, John Gladstone, B.A.
Weidenhammer, Fred. J., B.A.
Waines, William Leslie.
Wilson, Thomas Matheson, B.A.
Walks, Robert Hilton, B.A.

Total—21.

2. Certificates—High School Principals and Specialists, 1900.

Allin, Elizabeth, B.A. (Fr. and Ger.)
Bains, Archibald W., B.A.
Bishop, Charles Peter, B.A.
Bragg, Thomas George, B.A. (Classics, Fr. and Ger.)
Brown, Harry William, B.A. (Eng. and Hist., Fr. and Ger.)
Brown, Oliver Jenison, M.A.
Bruels, Ira Delos, B.A.
Campbell, Daniel Alexander, B.A. (Science.)
Carstairs, John Stewart, B.A. (Eng. and Hist.)
Colling, John Knowles, B.A. (Classics.)
Conn, Henry, B.A. (Science.)
Croskery, Robert Arthur, B.A. (Classics.)
Doidge, Thomas Clarke, B.A. (Commercial.)
Edwards, Clarence Bartlette, B.A.
Fraser, Charles McLean, B.A. (Science.)
Graham, William Andrew, B.A.
Johnston, John Kenneth, M.A. (Science.)
Kirkland, William Stuart, B.A. (Science.)
Lane, James Stanley, B.A. (Fr. and Ger.)

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2. Certificates—High School, etc.—*Continued.*

Lee, Samuel Carson, B A. (Science.)
Longmore, Howard Bruce, B.A.
Luton, James T., B.A. (Classics.)
MacPherson, Walter Ernest, B.A. (Eng. and Hist., Fr. and Ger.)
McNiece, James, B.A. (Science.)
McPhail, Alexander C., B.A.
Mowbray, William, B.A. (Eng. and Hist.)
Myer, Albert Nicholas, M.A. (Mathematics.)
Nichol, William Wallace, B.A. (Mathematics.)
Norman, Lambert, B.A. (Eng., Hist., Fr. and Ger.)
Park, Henry George, B.A., B.Pæd. (Classics.)
Power, John Francis, M.A. (Science.)
Rosevear, Howard Stanley, B.A. (Tor.); A.M. (Harvard). (Science.)
Spooner, Armon Cortez, B.A. (Eng. and Hist., Fr. and Ger.)
Stoddart, Robert, B.A. (Classics.)
Taylor, John Andrew, B.A. (Science.)
Van Every, John Fair, B.A. (Eng. and Hist., Fr. and Ger.)
Weidenhammer, Frederick J., B.A. (Fr. and Ger.) Total—37.

3. Certificates—High School Assistants and Specialists, 1900.

Anglin, Robert W., M.A. (Mathematics.)
Brown, Percy William. (Science.)
Cameron, John Shaw. (Mathematics.)
Carr, Walter Reuben, B.A. (Mathematics.)
Day, Alfred Ernest, M.A. (Eng. and Hist., Fr. and Ger.)
Dingle, Grace Keane, B.A. (Eng. and Hist., Fr. and Ger.)
Dolan, John Henry, B.A. (Classics.)
Durnin, George Alexander.
Johnston, Robert William.
Kilmer, Ernest Elgin C. (Science.)
Kirkland, William Stuart. (Science.)
Libby, Minnie Fennesey, B.A. (Eng. and Hist.)
McPherson, Angus William, B.A.
Martin, John Moore, B.A. (Science.)
Menish, Janet Isabel, B.A. (Eng. and Hist., Fr. and Ger.)
Might, Lincoln. (Science.)
Mills, Martha Christine, B.A. (Fr. and Ger.)
Moran, John Eaton.
Morgan, John James, B.A. (Science.)
Parlee, Edith. (Commercial.)
Phelps, Frances G., B.A. (Eng. and Hist., Fr. and Ger.)
Richardson, Kate. (Commercial.)
Riddell, Agnes R., M.A. (Eng. and Hist., Fr. and Ger.)
Rudlen, George William, B.A. (Mathematics.)
Tennant, Adelaide Emma, B.A. (Eng. and Hist., Fr. and Ger.)
Voaden, Arthur C. (Commercial.)
Wetherald, Hubert McKay.
Wightman, Robert, B.A. (Mathematics.) Total—28.

4. Number of Public School Teachers' Certificates, 1900.

	Male.	Female.	Total.
First Class Certificates	39	36	75
Second Class Certificates	122	512	634
Third Class, per County Model School reports	327	677	1,004

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5. List of Provincial Certificates issued by the Education Department, 1900.

I. FIRST CLASS.

Allingham, Thos. David.
Anderson, Henry Nichol.
Andrews, Louise.
Baker, Ada Helena.
Baker, Lilian Maude.
Bambridge, Celia.
Beale, Herbert Benson.
Bell, Sarah Jane.
Bruce, Jessie.
Bryce, Walter (B.A.).
Bulmer, Lizzie J.
Chace, Ethelwyn Gordon.
Choate, Annie.
Clark, Joseph Campbell, B.A.
Closs, Frank David.
Cluff, Elizabeth Maud, B.A.
Cook, Henry Francis.
Coons, Eardly S.
Corsant, Hannah.
Couch, Samuel.
Courtice, Samuel J.
Cruickshank, Libbie.
Culham, Hattie.
Dudley, Alice Maud.
Eagle, David.
Elliott, Robt. Leopold.
Forfar, Lena Maude.
Gordon, John Alex.
Guggisberg, Walter W.
Hanna, Winnie A.
Henderson, A. Ethyl.
Hobbs, Thomas.
Huyck, P. H.
Irwin, Joseph A.
Johnston, Agnes.
Kappele, May Isabella.
Keast, Walter.
Kennedy, Thomas.
Klippert, Katherine.
Lawrence, Edith.
Lick, Middie.
Loucks, Horatio.
McBride, Fred. Nelson.
McDougall, Duncan, B.A.
McEachern, Mary.
McLennan, Elizabeth.
McLennan, Jennie.
McTaggart, Alfred.
Malcolm, Wyatt.
May, Lillian D.
Minaker, Mary E.
Morris, Ethel.
Patterson, Annie Blanche.
Ramsay, James Alex.
Ross, Isabella M.
Saunders, William John.
Saunders, William Robt.
Schofield, Wm. Arthur.
Simpson, Ernstein.
Sine, Frederick.
Smith, John Alfred.
Spark, George.
Strachan, Ada M.
Tasker, Minnie Maude.
Taylor, John Gladstone, B.A.
Taylor, Mabel Annie.
Thompson. Geo. Lucan.
Twiss, Fannie Adelia.
White, Edwin Theodore.
Watterworth, Grace McC.
Widdis, John Bowers.
*Will, Geo. Edwin.
Williams, Ethel Jane. M.
Wyatt, W. Baxter.
Young, Ernest H.

Total—75.

II. SECOND CLASS.

(1) London Normal School, June, 1900.

Allin, Eleanor.
Augustine, Claire M.
Ayers, Marion.
Ball, Jessie R.
Barkley. John.
Bird, Laura.
Black, Maggie P.
Blackwell, Maud.
*Bogue, Edith.
Brown, Alice.
Brown, Violet F.
Bower, Helen.
Campbell, Flora B.
Campbell, Nellie.
Consitt, Annie E.
Courscey, Lily M.
*†Cripps, Minnie E.
Cundal, Minnie E.
Curtis, Jeremiah T.
*Dadson, Lena.
Davis, Mary E.
Davidson, Louise.
Dunkin, Charlotte.
Eby, Edgar O.
Evans, David W.
Fawcett, Jackson E.
Fee, Annie P.
Ferguson, Jessica,
Fettes, Lillie.
Field, Eva.
Flumerflet, William M.
Francis, Lena M.
French, Harriet.
Gillespie, Marjorie.

* Honors. † Medalist.

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(1) London Normal School—Continued.

Graham, Margaret.
Gray, Sadie.
Greaves, Maud.
Hair, Louise.
Hamilton, Anne.
Harcourt, Lizzie.
*Harrison, Henry.
Hassett, Etta.
Hawkins. Walter B.
Heath, William.
Holtby, Ada Visalia.
Hutton, Mary.
Hyde, Edith Blanche.
Jamieson, Nellie A.
Jarvis, Maud L. L.
*Keefe, Margaret.
Laird, E. Alberta.
*Lawrence, Herbert.
Lewis, Charity.
Love, Grace.
Lowe, Barbara.
Mair, Rebecca E.
Mann, Marjorie.
Mansell, Nathan C.
*Michener, Grace.
Miller, L. Trueman.
Milliken, Jessie.
Milne, John D.
Mowbray, Jennie.
*Murdock, Sarah.
Macdonald, Kate B.
Macdonald. Lilian.
Macpherson, Ada M.
McAllum, Irwin S.
McDonald, Phemia.
McKinnon, Charles J.
McLaren, Nettie R.
McQuarrie, Archibald A.
Neill, Ella.
O'Brien, M. Jennie.
O'Meara, Nellie.
Padfield, Mary.
Penfold, Maud M.
Pepper, Samuel D.
Plewes, Edith E.
Porteous, Marion D.
Rife, Eliza J.
Ripley, Amos T.
Rivers, Rebecca.
Ross, Bessie M.
Ross, Maud.
Sharp, William H.
Sheppard, Mabel.
Smith, Duncan.
Staples, Edgar.
Steer, Fanny E.
*Stewart, Kate M.
Sunter, Rachel.
Taylor, Ora.
Taylor, Walter James.
Thompson, Eleanor.
*Tovell, Ida J.
Walker, Stella.
Webster. Violet J.
Whittaker, Edith M.

Total—99

(2) Ottawa Normal School, June, 1900.

*Anderson. Harriet.
Armstrong, Bella.
Atcheson, Eliza Jane.
Bancroft, Laura Bella.
Barnett, Ella B.
Barry, Matthew Geo.
Bell, Arthur Meaford.
Bird, Eva Maud.
Black, Rhoda.
Bolton, Elmer.
Boyce, Henry A.
Brackenridge, Hugh F.
Byrnes, Maria.
Cahill, Hattie Marie.
†*Cain, Walter Chas.
*Cannon, Elma Edith.
Carr, Morley Norton.
Chapin, Arthur S.
Chapman, James Wellington.
Chisholm, Jessie Ross.
Cooper, Nellie M.
Draper, Mary Irene.
Duff, Bertha.
Ealand, Eva Mary.
Earle, Christie C.
Ennis, Aura.
Fader, Howard.
Fergusson, Sara Ellen.
Faulds, Anna Victoria
Franklin, Helen Gertrude.
Gale, Helen Iona.
*Gibson, John Wesley.
Gilbert, Eva Gertrude.
Gillespie, Ethel Mildred.
Gowsell, Mary Ethel.
Graham, John Albert.
Graham, Lizzie Mabel.
Hale, Lizzie A.
Harvey, Norman T.
Heenan, Maggie.
Heron, Janet.
Hipson, Sarah L.
Howes, Margt. Mathilde.
Hull, Annette.
Hutchison, John A.
Irwin, Emily G.
Johnston, Annie Young.
Jones, Angie.
Jones, Jennie R.
Kennedy, Emma V.
Kerr, Jessie E.
King, Annie Elizabeth.
Lawrie, Isabella.
Legge, Alberta.

* Honors. † Medalist.

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(2) Ottawa Normal School—Continued.

Legge, Annie Maud.
Leighton, Annie.
Ligget, Mabel.
MacIntyre, Maud.
Mackenzie, Malinda M.
McClure, Emma E.
McConnell, John.
McDonald, Ella.
McDougall, Tena.
McIntosh, Maud Marion.
McKee, Fred. W.
McKessock, Robt. James.
McLennan, Christina.
McQuade, Olivia.
Meldrum, Margaret Nicol.
Moorhouse, Lena.
Morris, Minnabel.
Pound, Lizzie.
Queen, Anna Elizabeth.
Ramsay, Charles.
Reilly, Maggie A.
*Robson, May Elizabeth.
Rorke, Minnie Bell.
Sewell, Jean Isabel.
*Shannon, Francis M.
Shaver, Thos. Peter.
Smith, Tena.
Somerville, David L.
Somerville, Joseph M.
Spence, Victoria Adelaide.
Stauffer, Joseph E.
Steele, Minnie Jessie.
Stuart, Edythe Pearl.
Thomson, Lillie Maud.
Thornton, Fred. Chas.
Toohey, Anna Mary.
Van Alstyne, Mai Irene.
Van Luven, Emma.
Ward, Maggie.
*Watson, Margaret Eleanor.
Weaver, Maud Helena.
Willer, May Maud.
Willoughby, Hester Maud.
Woodland, Muriel Ethel.

Total—58

(3). Toronto Normal School, June, 1900.

Aitchison, Isabella Murdie.
Allen, Lizzie Dunning.
Allen, Minnie Alexandria.
Anderson, Effie.
Archer, Jessie Isabel Agnew.
Armitage, Edith Edna.
Armstrong, Bella Maude.
Banting, Norma Agnes McLean.
Barton, Harriet Susie.
*Borland, Ethel.
Brock, Melissa.
Brooks, Annie Edythe.
Brown, Bertha.
*Buckham, Jessie Mar.
Burkholder, John Herbert.
Calder, Elizabeth.
Clowes, Mary Helen.
*Cobourn, Annie Amelia.
Cockrane, Florence May.
*Cole, Evelyn S.
Coristine, John H.
Currie, Mabel A.
Currie, Mary Walker.
Currie, Tena.
Dawson, Ethyl.
Deans, Isabella Cowan.
Delamere, Agnes.
Dickson, Dida May.
Dixon, Florence Aileen.
*Dixon, William F.
*Dowling, Fred Smeaton.
*Drury, John.
Farr, Nellie.
Ferguson, Josephine.
Foerster, Erlwin.
Frayn, Amelia Sarah.
*Gesner, Bertha.
Gifford, Mary Ann.
Glass, Celia.
Groff, Clara Louise.
Gundry, Florence May.
Haith, Sabina.
Hall, Edith Eleanor.
Harkley, Mary.
Harkness, Kate.
Hendry, Ethel Gertrude.
Hiscock, Eleanor Curragh.
*Hogg, Winifred Marg't.
Hunter, Martha.
Hunter, Miemma.
*Hutchinson, Lanah.
Hutchinson, Thomas.
Jackson, Emma.
Kennedy, Annie.
Kerr, Annie Edna.
Knapp, Sarah Edith.
†*Lacey, Essie.
Langs, Clara Rosemond.
Large, Adelaide.
*Leach, Minnie.
Legge, Bessie Adelaide.
Lewis, Edith Josephine.
*Lytle, Alice.
Marshall, Bella H.
*Martin, Alice.
*Martin, Maude.
Meldrum, Anna M.
Milne, Maggie.
Mitchell, Helen Agnes.
*Mittlefehldt, Frank.
Monkhouse, Sophia.
Mountjoy, Edith C.
Murch, Bessie Adeline.
Mackenzie, Janet Isabel.
McArthur, Marie.
McBrien, Alice.

* Honors. † Medalist.

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(3) Toronto Normal School—Continued.

McCabe, Rose.
McCully, Edith Sarah.
*McDonald, Ethel.
McEwen, Helen May.
*McKnight, Mabel.
McLauchlin, Sarah Victoria.
McLaughlin, Jessie.
*McLaughlin, Wm. Ernest.
McPherson, Jennie.
Newton, Amy.
*Nichol, John.
Page, Ida Mabel.
Peterson, Libbie.
Pilkey, Ida Bethia.
Pilkey, Jennie Forfar.
Pratt, Bella.
Proctor, Susie Elvira.
Poucher, Norman Young.
Reed, Lena.
Reid, Alma Jane,
Reynolds, Eleanor Spelman.
Roberts, Annie Sophia.
*Robertson, Alicia Enid.
*Robinson, Georgie.
Rowland, Ralph Stutt.
Saylor, Augustus Belle.
*Schmidt, Ina.
Sexsmith, Eliza.
Shantz, Minnie Bowers.
Sherriffs, Mary.
*Sing, Gertrude Mary.
*Smart, Maggie.
Smillie, Margt. Alice.
Smith, Agnes Falliott.
Smith, Alice Maude.
Smith, Maggie.
Snider, Geo. Egerton.
Steele, Berta.
*Stephens, Amelia Ann.
*Swalm, Isabel Rankin.
*Tedd, Nellie Emily.
*Thomas, Emilie Rosetta.
Thompson, Winnifred.
Van Camp, Cora May.
Vance, Robt. James.
Ward, Eva.
Watson, Laetitia Lydia, B.A.
Watson, Jessie.
Watson, Bertha Lorne.
White, Florence Jane.
*Willard, Susan.
*Willoughby, Mabel Estelle.
Young, Debbie.

Total—129

(4). London Normal School, December, 1900.

Adams, Edna Ross.
Adkins, Bertha.
Anderson, Jean.
Annis, Fannie.
Barrett, Robert John.
Bayne, Mary M.
Beaumes, Tina
Benn, Mary C.
Boddy, Eleanor E.
Boland, John Joseph.
Brenn, Maggie.
Brintnell, John D.
Bruce, Eva.
Caddy, Mrs. Alma.
Cameron, Alice.
Campbell, Archd. D.
*Clark, Annie M.
Corbett, Mildred.
Cowie, George.
Creech, Richard N.
Cruickshank, Thomas N.
Cunningham, Lizzie.
Dinsmore, Georgetta.
Dunn, Violet.
Ewing, Norma.
Ferguson, Mary Louise.
Findlay, Stella, R.
Fisher, Florence.
Fraser, Jennie C.
Gilbank, N. Berton.
Gowland, John E.
†*Graham, George.
Grant, Aletha.
Gray, Maggie.
Greenaway, William J.
Hammond, Sarah.
*Harrison, Duncan R.
Harvey, Abbie F.
Haskett, Violet M.
Higginson, Nellie.
Hilborn, Rose.
Hodges, Annie.
Houlahan, Patrick.
*Hurlburt, Fred. H.
Hutt, Mary M.
Jeffrey, Mabel.
Kilbourn, Lizzie.
Knowles, Margaret H.
Lints, Maggie.
Mark, Wesley.
Mills, J. Georgina.
Montgomery, Belle.
Moore, Lily Belle.
Murray, Annie.
McArthur, Mary.
McCoy, Emma.
McCue, Stasia E.
McDonald, David A.
McGregor, Daniel N.
McIntosh, Norman.
McIntyre, Annie May.
McIntyre, Katherine.
Macintyre, Maud.
McKee, Mary.

* Honors. † Medalist.

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(4) London Normal School—Continued.

MacKerracher, William.
McLaren, Alice.
MacRae, Mamie.
Parsons, Bertha.
Poole, Minnie.
Potter, Robert B.
Pratt, Eliza.
Reid, May.
Robinson, Minnie E.
Ross, Frederick.
Russell, Beatrice M.
*Sanders, Mamie L.
Scott, James A.
Snell, John A.
*Sproule, Muriel.
Sproule, Pearl.
Stewart, Lizzie M.
Stewart, Mary E.
Sunter, Bertha.
Sunter, Ellen.
Thorburn, Nellie.
Torrance, Grace.
Trout, Ella M.
Tye, Alice W.
Vanstone, Lizzie H.
Walker, Florence.
Ward, Jessie.
Warren, Clark.
*Williams, Eva L.

Total—93.

(5). Ottawa Normal School, December, 1900.

Bain, William Geo.
Baker, Lillian Collings.
*Bates, Esther.
Boyd, Wesley.
Brown Amelia.
Byrnes, Catherine.
Cairns, Laura.
Cameron, Lizzie.
Campbell, Edith Alice.
Carroll, Lena.
Chadwick, Norah Annie.
Colborne, Phœbe.
D'Arcy, Clara Agnes.
Davidson, Mildred.
Day, Clella Lavina.
†*Donald, Sara.
Dougan, May Charlotte.
*Doyle, Daniel Joseph.
Ellenor, Fannie.
Elliott, Hugh.
Elmhirst, Fred. John S.
Faulker, Ella.
Ferguson, Ernest Walton.
Ferris, Eva Montrose.
Gamble, William Geo.
Gile, Nina.
Gillespie, Elizabeth.
Grant, Christina Jessie.
*Greenan, Nellie.
Hanna, Jennie.
Hanna, Lillian Mabel.
*Heatlie, Norman James.
Helmer David Theodore.
Honeywell, Barbara Jane.
Hurlbut, Gertrude.
Innes, Maggie.
Johnston, Minnie Marion.
Johnston, Wilda Agnes.
Jones, Ella May.
Kerr, Chas. Bernard.
Kerr, Edmund T.
Kerr, Nina Jane.
King, William.
Koch, Henry R.
Lethbridge, Marion.
Loney, Katie.
Lynett, Jeannie.
*Mabee, Ethel.
Malloch, Margaret.
Middleton, Elizabeth.
Middleton, Lillie Edith.
Moore, James Herbert.
Morgison, Rose Veronica.
McCann, Nellie.
McDermid, James Angus.
McDougall, Florence Adeline.
McEwen, Agnes.
McLaughlin, William John.
McLean, Clara Grace.
McMillan, Christina Sara.
Nicol, Lizzie Isabel.
O'Brien, Annie.
Olmsted Mabel.
O'Leary, Mary.
O'Neail, Ella.
Palmer. Mary McNaughton.
Peverley, Ethel Margt.
Phillips, Winnifred Emily.
*Purdy, Agnes Rose.
Rattray, Jessie.
Robinson, Minnie Bell.
Roger, Mary.
Service, Ketha Winnifred.
Shaw, Iva May.
Skiffington, Annie.
Sparling, Anna May.
Stevens, Mrs. F. C. (Nellie).
Tasker, Fannie Eliza.
Taylor, Lizzie.
Teskey, Naomi May.
Thompson, Bertha Louise.
Urquhart, Julia.
Vail, Annie.
Weeks, Lizzie.
Whillans, Marie Louise.
Whiting, Adella.
Worley, Ernest Geo.
Wyman, Julia Ellis.

Total, 88.

*Honors. †Medallist.

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(6) *Toronto Normal School, December, 1900.*

Agnew, Bertha Ethel.
Ames, Milton Fralie.
Atkinson, Emily.
Badgerow, Pearl Hildred.
Barmby, Hattie.
Bateman, Mabel.
Baxter, Duncan Alex.
Beabion, Emma.
Bell, Eliza.
*Blacklock, Ella Rose.
Brisbin, Lottie.
Burbidge, Effa Maud.
Caldwell, Joseph Edward.
Campbell, Mamie Dunn.
Carroll, Annie Rebecca.
Carter, Imogen M. L.
Casserly, Lily Anna.
Clapp, Maud Sarah.
Clark, Ethel Elizabeth
Clarke, Jennie.
Clarke, Frank B.
Clayton, Geo. Alex.
Clemen, Nellie.
*Colles, May Evans.
Cook, Alice Lillian.
Courtice, John Thomas.
Crawford, Edith Lillian.
Crown, Eva.
Currie, Flora A.
Currie, Margaret Euphemia.
*Davis, Della Maud.
Decow, Jennie.
*Delany, Harriet Evelyn.
Denne, Margaret Jane.
Dunlop, Ethel Denison.
*Edwards, Ethel.
Erskine, Mary Frances.
Evans, Gertrude Beattie.
Evans, Maggie A.
Ferguson, Lexie.
Fry, Lillian Emma.
Fyle, Carrie Edith.
Golden, William John.
Hallett, Elizabeth.
Hanlon, James Raymond.
Harry, Frank Thomas.
Harvey, Albert.
Haslam, Nellie Mary.
Hastings, Ida Alberta.
Hewett, Clara A.
Hill, Russel Neil.
Hogg, Annie Maud.
Holmes, Mary Gertrude.
Hunter, Lizzie M.
Inch, William John.
*Inglis, Edna Louise.
Isbister, Lilla Belle.
Isbister, Nina Jeannette.
James, Mary Rebecca.
Jarmin, Frances Alma.
Johnston, Jennie Ann.
Johnstone, Maggie Ann.
Jose, Edith Jane.
Keenan, Jennie.
*Kirkwood, Margaret Pattullo.
Kinsley, Jean Mabel.
Lanigan, Kate A.
Livens, May.
*Martin, Lewis Alex.
Menzies, John Sinclair.
Miller, Minnie Jane.
Moore, Eleanor Louise.
*Moran, Mary Elizabeth.
Muckle, Mary Jane.
Munn, May Hamilton.
Mackenzie, Anna Mabel.
McAsey, Nellie Elizabeth.
*McClive, Fanny T.
McCracken, Mary Elvira.
McDonald, Thos. Albert.
McKitterick, Annie Ellen.
McMillan, Helen.
†*Nelson, Marcus Octavius.
Ness, Arthur Edward.
Norris, Sarah Martha.
Norton, Jane Ann E.
Olver, Clara Henrietta.
Pettit, Etta.
Pettapiece, Bell Frances.
Platt, Addie Mabel.
Potts, Florence Almenda.
Precious, John Hunt.
Putnam, Cora Estelle.
Redmond, Jessie.
Richardson, Geo. Parker.
Ross, Viola.
Rowe, Carrie Melissa.
*Rowe, Florence Mabel.
Sheppard, Fannie.
Shier, Edith Amanda.
Simpson, Isabelle.
Smillie, Jennie.
Smith, Ida.
Smith, Jessie Wallace.
Smith, Estella Olive.
Smith, Dora J. M.
Smyth, Ina Gertrude
Steele, Ida Esther.
*Steiner, Estelle Sophy.
Stokes, Maggie.
Tackaberry, Edith Maude.
Thomas, Mary Elizabeth.
Thompson, Mary Elizabeth.
*Thomson, May.
Tilson, Anna.
*Tunnah, Mary Graham.
Vardon, Mabel Sadie.
Walker, Laura Harvey.
Walsh, Elizabeth E.
Warnica, Edna Medora.
Weaver, Ora.
Weir, Lucie Mussen.
Wilcox, Louise Alice.
Winn, Elizabeth Gertrude.

Total—124.

* Honors. † Medalist.

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(7) *Second-class Certificates granted under subsection 8, section 4, cap. 291, R.S.O. 1897.*

Hindle, George, B.A.
Martin, Arthur, B.A.
Potter, Lucy Eleanor, B.A.

Total—3.

6. Kindergarten Certificates, 1900.

Directors.

Bignell, Florence.
Bucham, Georgie.
Bradshaw, Olive.
Cameron, Alison.
Courtney, Edith.
Cassidy, Delores
Davidson, Annie S.
Evans, Ella A.
*Fuller, Alice.
Grant, Alice.
Greene, Evelyn.
Jamieson, Isabel.
Jones, A. Edith.
Kidd, Maud.
Love, Mabel.
McConnell, Lulu.
Martin, May E.
Nudel, Louise.
Purser, Eliza M.
Phillips, Florence.
Randall, Minnie.
Rattray, Margie.
Ready, Evelyn.
*Reikie, Helen.
*Robinson, Violet.
Rupert, May.
Sullivan, Frances.
Saunders, May I.
Small, Alma.
Thomson, Annie S.
Thompson, Alice.
Whitton, Jean.
Warner, Ella.
Wilson, Irene.
Withers, Nellie.
Woodcock, Henrietta.
Woods, Ida.

Total—37.

Assistants.

Allan, Maud.
Anglin, Frances.
*Anderson, Alice M.
*Carlyle, Blanche.
Chamberlain, Florence.
Chamberlain, Lillian.
Doughty, Ethel M.
Doble, Florence.
*Dyke, Eunice.
*Edwards, Maude M.
Fawcett, Marie.
Grant, Annie C.
Grant, Isabella C.
Galloway, Ruby.
Holman, Nellie.
*Henry, Mina.
Keith, Margaret.
*Kittridge, Bella Stuart.
Loucks, Grace.
Lawrence, Allie Dee.
Lowrie, Gertrude M.
McTaggart, Helen.
*Moore, Augusta E.
Macorquodale, Maud L.
*Millichamp, Florence.
Rush, Lillian Hamilton.
Robertson, Maud.
Ritchie, Edith L.
Scott, Margaret.
Somerville, Mary G.
Welch, Frances E.
*Wigle, Colnette V.
Webber, Mabel.
Wilson, Grace.

Total—34.

7. Domestic Science Certificates, 1900.

Bowditch, Florence K.
Fleming, Catherine E., B.A.
Higgins, Lulu.
Hunter, Alison Jean.
Hunter, Ida M.
Jenkinson, Gertrude.
Milligan, Kathleen Maude.
McBeth, Mrs. Emma.
Parsons, Minnie Radcliffe.
Ross, Nellie C., B.A.
Sutherland, Grace.

Total—11.

*Honors.

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8. Temporary and Extended Certificates Issued During 1900.

Counties.	Temporary certificates authorized by the Minister of Education during the year.	Third Class certificates extended by the Minister of Education during the year.
Carleton	9	....
Dufferin	....	1
Essex	10	1
Frontenac	5	....
Glengarry	1	1
Grey	1	....
Kent	....	1
Lambton	1	....
Lanark	1	2
Leeds and Grenville	2	1
Norfolk	2	1
Northumberland	....	1
Ontario	1	4
Prescott and Russell	3	...
Renfrew	....	2
Simcoe	....	2
Stormont	2	1
Districts (Algoma and Parry Sound)	25	3
Eastern Ontario, R.C.S.S	....	1
Western Ontario, R.C.S.S	3	....
Total, 1900	66	22
" 1899	58	26
Increase	8	....
Decrease	....	4

APPENDIX N.—*MEMBERS OF THE EDUCATIONAL COUNCIL AND BOARDS OF EXAMINERS; LIST OF HIGH SCHOOL PRINCIPALS AND ASSISTANTS.*

1. Members of the Educational Council, 1899–1900.

Educational Council.

Under the provisions of section 5, cap. 291, R. S. O., 1897. the following gentlemen were appointed members of the Educational Council :

James Loudon, M.A., LL.D , President of the University of Toronto.
Maurice Hutton, M.A., of Toronto University.
The Rev. N. Burwash, M.A., LL.D., Chancellor of Victoria University.
The Rev. William Clark. M.A., D C.L, F.R.S.C., of Trinity University.
A. P. Knight, M.A., M.D., of Queen's University.
A. B. MacCallum, B.A., Ph. D., of University of Toronto,
The Rev. J. H. Farmer, B.A., LL D., of McMaster University.
Alfred Baker, M.A., of University of Toronto.
The Rev. J. R. Teefy. M.A., LL.D., Principal of St. Michael's College.
W. Tytler, B.A., Public School Inspector, Guelph.
Cortez Fessenden, M.A., Principal of Collegiate Institute, Peterborough.
G. H. Armstrong, M.A., B. Paed, Principal of Borden St. Public School, Toronto.

W. PAKENHAM, B. A.,
Registrar.

JAMES LOUDON, M. A., LL.D.,
Chairman.

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2. Boards of Examiners for 1900.

(1) Public School Leaving or Part I. Junior Leaving Board.

W. H. Ballard, M.A., I.P.S., Hamilton.
A. Carruthers, M.A., Toronto.

(2) High School Leaving and University Matriculation Board.

W. J. Alexander, B. A., Ph. D., Toronto University.
A. J. Bell, M.A., Ph. D., Victoria University, Toronto.
R. R. Bensley, B.A., Toronto University.
Pelham Edgar, B.A., Ph.D., Victoria University, Toronto.
W. H. Fraser, B.A., Toronto University.
W. L. Goodwin, D. Sc., Queen's University, Kingston.
L. E. Horning, M.A., Ph. D., Victoria University, Toronto.
G. W. Johnston, B.A., Ph. D., Toronto University.
A. E. Lang, B.A., Victoria University, Toronto.
W. J. Loudon, B.A., Toronto University.
A. C. McKay, B. A., McMaster University, Toronto.
A. B. Nicholson, B. A., Queen's University, Kingston.
A. Odell, I.P.S., Cobourg.
W. Prendergast, B.A., Toronto.
A. H. Young, M. A., Trinity University, Toronto.

(3) Commercial Diploma Board.

G. W. Johnston, F. C. A., Upper Canada College, Toronto.
E. C. Srigley, Woodstock,

(4) Commercial Specialist Board.

W. J. Dobbie, B.A., Guelph.
W. E. Evans, Galt.

(5) Kindergarten Board.

Miss E. Cody, Toronto Normal School.
J. L. Hughes, I.P.S., Toronto.
Miss Jean Laidlaw, London.
Miss M. E. Macintyre, Toronto Normal School.

(6) Normal School Board.

C. A. Barnes. M.A., I.P.S., London.
R. H. Cowley, M.A., I.P.S., Ottawa.
I. Day, B.A., I.P.S., Orillia.
J. S. Deacon, I.P.S., Milton.
W. E. Groves, Toronto.
A. A. Jordan, Prescott.
D. A. Maxwell, M.A., LL.B., Ph. D., I.P.S., Windsor.

(7) Examiners in Practical Teaching at the Normal Schools.

A. Brown, I.P.S., Morrisburg.
J. H. Carson, I.P.S., London.
W. H. G. Colles, B.A., I.P.S., Chatham.
R. H. Cowley, M.A., I.P.S., Ottawa.
A. B. Davidson, B.A., I.P.S., Newmarket.
T. Hilliard, I.P.S., Waterloo.
J. H. Knight, I P.S., Lindsay.
F. L. Michell, M.A., I.P.S., Perth.
J. McBrien, I.P.S., Mt. Albert.
D. McDiarmid, M.D., I.P.S., Maxville.
R. Park, I.P.S., Chatham.
J. H. Smith, I.P.S., Hamilton.
J. J. Tilley, I. Co. M.S., Toronto.

(8) Normal College Board.

T. Carscadden, M.A., Galt.
J. D. Christie, B.A., Simcoe.
C. L. Crassweller, B.A., Essex.
J. A. Fife, B.A., Peterboro'.
J. Houston, M.A., Clinton.
T. A. Kirkconnell, B.A., Port Hope.
J. H. McGeary, M.A., St. Thomas.
J. Marshall, M.A., Kingston.
T. H. Redditt, B.A., Barrie.
G. H. Reed, B.A., B. Paed, Markham.
E. O. Sliter, M.A., Kingston.
G. A. Smith, B.A., Toronto.
J. G. Witton, B.A., Walkerton.

(9) Model School Board.

E. D. Parlow, Ottawa.
Miss M. T. Scott, Toronto.
J. F. White, Toronto.

(10) Art School Board.

F. M. Bellsmith, Toronto.
A. C. Casselman, Toronto.
A. H. Howard, Toronto.
M. Matthews, Toronto.
C. M. Manley, Toronto.
Rev. Bro. Maxentius, Toronto.
T. R. Roseburgh, Toronto.
W. A. Sherwood, Toronto.
L. B. Stewart, Toronto.
W. L. Symons, Toronto.
A. J. Reading, Toronto.

(11) Domestic Science Board.

Miss M. Kennedy, Hamilton.
Miss N. C. Ross, B.A., Toronto.

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3.—List of Principals and Assistants of High Schools (Including Collegiate Institutes), January, 1901.

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
Aylmer	Rutherford, Walter W	B.A., Tor	Math	1883	$ 1,400
	Phelps, Frances G	B.A., Tor	Eng., His., Fr., Gr.	1896	700
	Brown, Lyman	B.A., Tor	Class	1899	800
	Kilmer, Ernest E. C		Sci	1899	850
Barrie	Redditt, Thomas H	B.A., Tor	Eng., His., Fr. Gr	1893	1,500
	Hay, Andrew		Math	1882	1,000
	Minns, James Edward	B.A., Vic	Math., Sci.	1893	1,000
	Kemp, William (Interim)	M.A., Queen's	Eng., His., Fr., Ger.	1901	700
	Moir, M. Annie		Commercial (Interim).	1895	700
	Bennett, Charles V.	B.A., Queen's	Class	1897	900
Brantford	Burt, Arthur William	B.A., Tor	Eng., His., Fr., Gr.	1893	1,800
	Passmore, Samuel F	M.A., Tor	Class	1885	1,100
	Hoag, James P.	B.A., Queen's	Eng., His., Math	1893	1,100
	Coates, Daniel Harsum	B.A., Tor	Math	1893	1,100
	Bunnell, Effie Maria	B.A., Tor	Eng., His., Fr., Ger	1891	1,000
	Hamilton, James Reid	B.A., Tor	Sci	1893	1,100
	Shultis, Adam		Commercial	1896	1,000
Brockville	Marquis, Thomas G	B.A., Queen's	Eng., His	1897	1,500
	Copland, James Stuart	B.A., Tor., M.A., McMaster	Sci	1889	1,000
	Sidley, Henry R.	B.A., Trin.	Class	1895	1,000
	Husband, Almeron Judson	B.A., Tor	Fr., Ger.	1895	1,000
	McGee, Cyril Haughton	B.A., Trin.	Math	1897	1,000
	Giles, A. Edith			1890	700
	Richardson, Kate		Commercial	1898	600
Chatham	Paterson, David Smith	B.A., Tor	Eng., His., Fr., Ger	1888	1,500
	Twohey, William J.	M.A., Tor	Class	1885	1,200
	Taylor, Wilson	B.A., Tor	Math	1893	1,200
	Jewett, Albert E.	B.A., Queen's	Sci	1896	1,200
	Lane, James S.	B.A., Tor	Fr., Ger.	1898	950
	Black, James Spurgeon		Commercial	1895	1,000
	Mowbray, William	B.A., Tor	Eng., His	1899	800
Clinton	Houston, John	M.A., Tor	Eng., His., Fr., Ger	1892	1,225
	Rand, Wilfred Erl	B.A., Tor	Math	1892	950
	McLean, Ebenezer M		Sci	1894	900
	Treleavan, John Wesley	B.A., Tor	Class (Interim)	1895	850
	Parlee, Edith		Commercial	1898	600
Cobourg	Mitchell, George Winter	M.A., Queen's	Class	1891	1,400
	Arthur, Colin Clayton	M.A., Queen's	Sci	1893	800

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	Odell, John W.	B.A., Tor	Math	1895	1,000
	Jones, Laura L	B.A., Tor	Eng., Hist., Fr., Ger	1898	900
	Race, Cecil E. (Interim)	B.A., Tor	Math., Com	1901	750
Collingwood	Williams, William	B.A., Tor	Eng., Hist., Fr., Ger	1873	1,100
	Hammill, George	B.A., Tor	Math	1892	900
	Colling, John Knowles	B.A., Tor	Class	1899	800
	Carefoot, George A.		Sci	1900	650
	Simpson, Robert S. (Interim)		Commercial	1899	650
Galt	Carscadden, Thomas	M.A., Tor	Eng., Hist.	1885	1,750
	Logan, Charles James	B.A., Trin.	Class	1883	1,200
	Wright, Arthur Walker	B.A., Tor	Fr., Ger.	1886	1,100
	DeGuerre, Ambrose	B.A., Tor	Math	1890	1,100
	Evans, William Edwin		Commercial	1892	950
	Hamilton, Robert S	B.A., Tor	Sci	1894	1,100
Goderich	Strang, Hugh Innis	B.A., Tor	Class	1871	1,300
	Moore, Alvin Joshua	B.A., Tor	Math	1880	950
	Field, John M	B.A., Tor	Eng., Hist., Fr., Ger	1900	900
	Grant, Burton D. (Interim)		Sci	1895	900
	McLellan, Kate			1895	700
	Cooper, Grant (Interim)			1900	600
Guelph	Davison, James	B.A., Vic	Math	1892	1,400
	Hill, Ethelbert Lincoln	B.A., Tor	Sci	1889	1,000
	Skinner, Kate Clara	B.A., Tor	Eng., Hist, Fr., Ger	1895	800
	Wilson, Henry Ernest	B.A., Tor	Class	1895	950
	Charlesworth, John William			1888	800
	Dobbie, William James	M.A., Tor	Commercial	1892	800
Hamilton	Thompson, Robert Allen	B.A., Tor	Math	1886	1,800
	Turner, John Burgess	B.A., Queen's	Math., Sci.	1885	1,400
	Paterson, Andrew	M.A., Trin		1874	1,200
	Crawford, John Thomas	B.A., Tor	Math	1889	1,200
	Logan, William McGregor	M.A., Tor	Class	1892	1,200
	Hogarth, Eber Septimus	B.A., Tor	Eng., Hist., Fr., Ger	1892	1,200
	MacPherson, Frederick Fotheringham	B.A., Tor	Eng., Hist., Fr., Ger	1894	1,200
	Gill, James	B.A., Tor	Math	1892	1,100
	Morgan, Sydney Albert	B.A., Tor., D. Paed	Class	1891	1,100
	Davidson, Margaret Cheyne			1876	800
	Asman, Henry Oldrid Evison	B.A., London, Eng.		1891	1,000
	Armstrong, William Gilnockie	M.A., Tor	Eng., Hist., Fr., Ger. (Interim)	1895	800
	Johnston, George Lang	B.A., Queen's	Commercial (Interim)	1888	800
	Morgan, Harriet Emma			1897	500
Ingersoll	Briden, William	B.A. Queen's	Class., Eng. Hist	1886	1,200
	Gundry, Arthur P		Sci	1894	1,000
	McDonald, George L.	B.A., Tor	Eng. Hist., Fr., Ger	1895	1,000
	Cameron, John Shaw		Math	1898	800
	Norman, Lambert	B.A., Tor	Eng., Hist., Fr., Ger.	1897	800
Kingston	Ellis, William Stewart	B.A., Vic	Math., Sci.	1893	1,800

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LIST OF PRINCIPALS AND ASSISTANTS OF HIGH SCHOOLS (INCLUDING COLLEGIATE INSTITUTES), JANUARY, 1901.

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
					$
Kingston	Sliter, Ernest Oscar	M.A., Tor	Class	1888	1,200
	Dales, John Nelson	M.A., Tor	Eng., Hist., Fr., Ger	1889	1,200
	Marshall, John	M.A., Queen's	Eng., Hist.	1897	1,200
	Lingwood, Frederick H	M.A., Trin	Class	1894	800
	Sills, William Ryerson	M.A., Queen's	Math	1897	1,100
	Sexton, James Henry		Sci. (Interim)	1898	800
	Ward, William		Commercial	1898	900
	Duff, James	M.A., Queen's	Eng., Hist., (Interim)	1899	600
	Hinch, Nicholas Edward (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1900	700
Lindsay	Harstone, John C.	B.A., Tor	Math	1886	1,400
	Stevens, William H.	B.A., McGill	Sci	1889	1,100
	Hardy, Edwin A	B.A., Tor	Eng., Hist., Fr., Ger.	1889	1,100
	Addison, Margaret Eleanor	B.A., Vic	Eng., Hist., Fr., Gr	1901	1,000
	Colling, James	B.A., Tor	Class	1894	1,100
	Taylor, Luther M. (Interim)		Commercial	1900	800
London	Radcliffe, Samuel John	B.A., Tor	Eng., Hist., Fr., Ger.	1891	1,800
	Little, Robert A	B.A., Tor	Class	1886	1,400
	Ferguson, William Chalmers	B.A., Tor	Eng., Hist., Fr., Ger.	1892	1,250
	McCool, John	M.A., Tor	Eng., Hist., Fr., Ger.	1897	1,125
	McCready, Samuel B.	B.A., Tor	Sci. (Interim)	1898	1,125
	Govenlock, William M	B.A., Tor	Math	1898	1,100
	Wilson, Nicholas			1866	1,050
	Andrus, Guy A			1888	1,100
	Edwards, Clarence B	B.A., Queen's	Eng., Hist. (Interim)	1894	1,100
	Riddell, Frank P.	B.A., Tor	Class	1898	1,000
	Jones, Samuel S.			1892	1,000
	Horton, Charles W.	B.A., Queen's	Eng., Hist.	1895	1,000
	Dickinson, James A.		Commercial (Interim)	1895	1,000
	McCutcheon, Frederick Wm. Caswell	B.A., Tor	Math., Eng., Hist	1900	1,000
	Voaden, Arthur		Commercial	1898	975
	Downing, John Henry			1900	925
	Hanson, Fannie M			1886	800
	Kelso, Alice C.			1896	800
Morrisburg	Jamieson, James Smyth	M.A., Vic	Eng., Hist	1882	1,200
	Massey, Arthur Wallace	B.A., Vic	Eng., Hist., Math	1892	850
	Kirkland, William Stuart	M.A., Queen's	Sci	1898	800
	Albarus, Hedwig Selma	B.A., Tor	Fr., Ger.	1899	750
	Croskery, Robert Arthur	B.A., Queen's	Class	1899	800

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Napanee	Dandy, William P	B.A., Tor	Commercial (Interim)	1900	750
	Flach, Ulysses J	M.A., Tor	Math	1900	1,200
	French, Frederick William	B.A., Tor	Class	1894	1,000
	Reid, Marvin Ryckman. (Interim)	M.A., Queen's	Sci	1900	800
	VanEvery, John Fair	B.A., Tor	Eng., Hist., Fr., Ger	1897	800
	Nicol, Margaret A			1891	600
	Smith, Margaret			1892	600
Niagara Falls	Dickson, James D	B.A., Tor	Math	1893	1,300
	Walker, David McKenzie		Commercial	1893	1,000
	Whyte, David, (Interim)	B.A., Tor	Sci	1900	800
	Fleming, Ethel Catharine (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1900	850
	Tasker, Lawrence Herman	M.A., Tor	Class	1898	1,000
	Dobbie, Mary (Interim)			1900	500
Ottawa	Macmillan, John	B.A., Tor	Eng., Hist	1881	2,400
	Jolliffe, Orion John	M.A., Vic	Class	1884	1,700
	McDougall, Alexander Hiram	B.A., Tor	Math	1889	1,700
	Alexander, Luther Herbert	M.A., Tor	Eng., Hist., Fr., Ger	1894	1,500
	Sykes, Wm. John	B.A., Vic	Eng., Hist., Fr., Ger	1894	1,500
	Stothers, Robert	B.A., Queen's		1887	1,200
	Norris, Isaac Taylor	B.A., Queen's	Math	1898	800
	Conklin, James Davidson		Commercial	1894	1,200
	Campbell, Daniel A	B.A., Tor	Sci	1896	1,200
	Graham, Wm. Andrew	B.A., Tor		1895	950
	Scott, Bessie Mabel			1892	800
	Macmillan, Herbert S. (Interim)	B.A., Tor	Fr., Gr	1897	850
Orillia	Dickson, John Elder	B.A., Tor	Class., Eng., Hist	1899	1,200
	Liebner, Ernest		Sci	1894	800
	Doidge, Thomas Clarke	B.A., Tor	Math., Commercial	1900	800
	Langrill, Adelaide Jane (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1899	600
	Beaton, Kate Florence (Interim)	B.A., Queen's		1899	600
	Scovell, Holland R (Interim)	B.A., Tor	Fr., Ger	1900	600
Owen Sound	Jenkins, Wm. H	B.A., Tor	Sci	1893	1,600
	Packham, James Henry	B.A., Vic	Math., Commercial	1884	1,100
	Murray, Thomas	B.A., Tor	Math	1897	1,100
	McKellar, Herbert S	B.A., Tor	Fr., Ger	1898	1,100
	Brough, Thomas Allardyce	B.A., Queen's	Eng., Hist	1893	1,100
	Burgess, Herbert H	B.A., Queen's	Eng., Hist	1892	1,100
	Jolliffe, Richard Orlando	B.A., Tor	Class	1899	1,000
	Hamilton, William J (Interim)		Sci	1901	700
Perth	Hardie, William	B.A., Tor	Class	1892	1,200
	Edmiston, James Alfred			1893	850
	Rosevear, Howard Stanley	B.A., Tor., A.M., Harv	Sci	1898	950
	McKim, William Andrew	B.A., Tor	Eng., Hist., Fr., Ger. (Interim)	1900	800
	Murray, Alexander	M.A., Aberdeen	Math	1900	900
Peterborough	Fessenden, Cortez	M.A., Trin	Math	1890	2,000
	Fife, James A	B.A., Tor	Math., Sci	1887	1,200

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
Peterborough	Jeffries, John	B.A., Tor	Eng., Hist., Fr., Ger	1890	$1,200
	Kenner, Henry R. H	B.A., Tor	Class	1893	1,200
	McPherson, Angus William	B.A., Tor		1899	750
	Fife, Mary H. A (Interim)	B.A., Tor		1899	600
Ridgetown	Smith, James Harvey	M.A., Queen's	Sci	1888	1,000
	Reid, Robert	B.A., Tor	Eng., Hist., Fr., Ger	1895	800
	Marshall, John Wells (Interim)	B.A., Queen's	Class	1899	700
	Keillor, James	B.A., Queen's		1892	650
	Wagar, Gardiner Lincoln	B.A., Tor	Math. (Interim)	1900	700
Sarnia	Grant, David M	B.A., Tor	Class	1885	1,400
	Corbett, Louis C	B.A., Tor	Eng., Hist., Fr., Ger	1891	1,100
	Corkhill, Edward James	B.A., Queen's	Sci	1891	1,000
	Campbell, Alexander	B.A., Tor	Math	1890	1,000
	Pottinger, Sylvia V			1875	750
Seaforth	Mowat, Alexander	B.A., Tor	Eng., Hist. (Interim)	1900	1,200
	Hogg, John L	B.A., Tor	Math. (Interim)	1900	1,000
	Rogers, George F	B.A., Vic	Sci	1900	900
	Kirkwood, Florence Ethel (Interim)	B.A., Tor	Class	1901	800
	Kirkman, Barbara		Fr., Ger	1884	725
Stratford	Mayberry, Charles Alexander	B.A., LL.B., Tor	Class	1890	1,550
	Robertson, Hugh S	B.A., Tor	Math	1900	1,050
	Lennox, Thomas H	B.A., Tor	Sci	1900	1,000
	Libby, Walter	B.A., Vic	Eng., Hist., Fr., Ger	1897	1,000
	Malcolm, George	B.A., Queen's		1890	950
	Fletcher, William Hugh		Commercial	1899	900
	Marty, Sophie E	M.A., Queen's	Eng., Hist., Fr., Ger	1899	1,000
Strathroy	Wetherell, James Elgin	B.A., Tor	Class., Eng., Hist	1883	1,500
	Auld, Charles	B.A., Tor	Math. (Interim)	1900	850
	Cook, Margaret	M.A., Tor	Eng., Hist., Fr., Ger	1895	810
	Conn, Henry	B.A., Tor	Sci	1900	900
	Kent, Eleanor		Commercial (Interim)	1899	700
St. Catharines	Henderson, John	M.A., Tor	Class., Eng., Hist	1872	1,600
	Robertson, William John	B.A., Tor., LL.B., Vic	Math	1874	1,200
	Giffin, James A	B.A., LL.B., Tor	Sci	1894	1,100
	Cloney, Sarah Louisa	M.A., Queen's	Eng., Hist., Fr., Ger	1896	900
	Laing, Arthur Stewart		Commercial	1898	900
	Stevenson, William John			1892	700
	Caverhill, Arthur E			1894	700

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St. Mary's	Martin, Stephen	B.A., Tor	Math	1886	1,200
	Follick, Thomas Henry	B.A., Vic	Sci	1885	900
	Clayton, Adelaide Helena R	B.A., Tor	Eng., Hist., Fr., Ger	1892	850
	Glassey, David Alex	B.A., Tor	Class	1894	900
	McDougall, Graham (Interim)	B.A., Tor	Class	1901	550
St. Thomas	Quance, Noah	B.A., Tor	Class	1891	1,500
	McGeary, John Henry	M.A., Tor	Math	1888	1,200
	Stevenson, Orlando John	M.A., Tor	Eng., Hist., Fr., Ger	1897	1,200
	Marty, Aletta Elise	M.A., Queen's	Fr., Ger	1894	1,200
	Lees, Richard	M.A., Queen's	Sci	1894	1,200
	Johnson, Robert Wilbur			1898	750
	Meiklejohn, Allen James (Interim)	B.A., Queen's	Eng., Hist	1899	650
Toronto (Harbord st.)	Spotton, Henry Byron	M.A., Tor	Class., Sci	1891	2,600
	Hagarty, Edward William	B.A., Tor	Class	1891	1,600
	Balmer, Eliza May	B.A., Tor	Eng., Hist., Fr., Ger	1891	1,600
	Lawler, Gertrude	M.A., Tor	Eng., Hist., Fr , Ger., Math	1891	1,600
	Smyth, Thomas Henry	M.A., Tor	Sci	1891	1,600
	Cox, John Loane	B.A., Tor	Math	1892	1,600
	Eldon, Robert Henry		Math., Commercial	1891	1,600
	Forfar, Charles	B.A., Tor	Eng., Hist., Fr., Ger	1892	1,200
	Kennedy, Lyman Aaron	M.A., Vic		1892	1,200
	Strath, Robert Smith	B.A., Tor		1893	1,200
	Clark, Luther J	B.A., Queen's		1896	1,200
	Carstairs, John Stewart	B.A., Tor	Eng., Hist	1899	1,200
Toronto (Jameson ave.)	Embree, Luther Edmund	M.A., Tor	Class., Eng., Hist., Fr., Ger	1888	2,600
	Smith, Gilbert Acheson	B.A., Tor	Sci	1889	1,600
	Hillock, Julia S	B.A., Tor	Fr., Ger	1900	1,600
	Birchard, Isaac J	M.A., Tor	Math	1893	1,600
	Crawford, Henry J	B.A., Tor	Class	1894	1,600
	Millar, James			1888	1,500
	Wismer, John Anderson	M.A., Trin		1889	1,600
	Spence, Nellie	B.A., Tor	Class., Eng., Hist	1889	1,600
	Sinclair, John	B.A., Tor		1898	1,200
Toronto (Jarvis st.)	Manley, Frederick Fitzpayne	M.A., Tor	Math	1875	2,600
	Chase, George A	B.A., Tor	Eng., Hist., Fr., Ger	1889	1,600
	Gray, Robert A	B.A., Tor	Math	1900	1,600
	Shaw, George Edmund	B.A., Tor	Eng., Hist., Fr., Ger	1876	1,600
	Grant, Wilbur		Math	1881	1,600
	Michell, William C	B.A., Tor	Class	1897	1,600
	Gundy, Henry Wentworth (Interim)	B.A., Tor	Class	1900	1,200
	Lehmann, Carl	B.A., Tor	Science (Interim)	1898	1,600
	MacMurchy, Helen			1880	1,200
	Thomas, Janie	B.A., Tor	Eng., Hist. (Interim)	1882	1,200
Whitby	Hogarth, George Henry	B.A., Tor	Math	1899	1,100
	Thompson, Peter M. (Interim)	M.A., Queen's	Sci	1900	700
	Burnham, Archibald M. (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1900	650

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List of Principals and Assistants of High Schools (Including Collegiate Institutes), January, 1901.

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of Appointment.	Salary.
Whitby	Black, Harvey H. (Interim)	M.A., Queen's	Class	1900	$700
	Walks, Robert H	B.A., Tor	Eng., Hist. (Interim)	1901	700
Windsor	Cody, William Stephen	B.A., Tor	Math	1893	1,500
	Gavin, Frederick P.	B.A., Queen's	Sci	1892	1,000
	Bell, Frederick Henry	B.A., Tor	Eng., Hist., Fr., Ger	1898	900
	McVicar, Archibald	B.A., Tor	Eng. Hist	1898	800
	Messmore, Joseph F	B.A., Tor	Class	1899	900
	Neilson, James		Commercial	1898	900
	Cleary, Norah. (Interim)	B.A., Tor		1900	700
Woodstock	Levan, Isaac Master	B.A., Tor	Class., Eng., Hist., Fr., Ger.	1898	1,500
	Griffin, Albert Dyke		Math	1882	1,100
	Kerr, Charles Staple	B.A., Tor	Eng., Hist. (Interim) Class	1889	1,000
	Stevenson, Andrew	B.A., Tor	Eng., Hist	1896	1,000
	Cole, James McLarty		Sci	1898	1,000
	Srigley, Edward Cooper		Commercial	1895	750
	Errett, Charles Francis			1897	700
High Schools.					
Alexandria	McKay, Donald	B.A., Tor	Class	1895	1,250
	Longmore, H. Bruce	B.A., Queen's		1898	750
	O'Brien, Lizzie			1896	650
Almonte	McGregor, Peter Campbell	B.A., Queen's	Class	1882	1,100
	McPhail, Alexander C	B.A., Queen's		1899	750
	Armour, Amy A.		Fr., Ger. (Interim)	1893	797
	Thompson, Margaret Jane	B.A., Queen's	Fr., Ger. (Interim) Eng., Hist.	1895	770
Arnprior	Morrow, Archibald Elston	B.A., Tor	Class	1898	1,100
	Rudlen, George William	B.A., Tor	Math	1898	700
	Day, Alfred Ernest	M.A., Queen's	Fr., Ger., Eng., Hist	1898	625
Arthur	Snider, Egerton E	B.A., Vic	Math	1896	1,050
	Elder, William J (Interim)	B.A., Tor		1899	525
	Hancock, John H (Interim)	B.A., Tor		1900	500
Athens	Massey, Norman Levi	B.A., Vic	Math	1898	900
	Bishop, Charles Peter	B.A., Queen's		1895	700
	Dowsley, William Clinton (Interim)	M.A., Queen's	Class., Hist., Eng.	1899	650
	Jackman, William Thos. (Interim)			1901	750
Aurora	Mulloy, Charles W	B.A., Tor	Class	1896	1,000
	Rice, John			1895	650
	Mills, Martha Christine	B.A., Queen's	Fr., Ger	1898	500
Beamsville	Myer, Albert Nicholas	M.A., Trin	Math	1898	800

	Ball, Kathleen Hester			1892	550
Belleville	Milburn, Edward Fairfax	B.A., Trin		1893	1,200
	Knight, William W		Math	1892	900
	Clarke, Henry Jellyman		Sci	1892	850
	McRae, Jesse Carre			1889	600
	Luton, James T	B.A., Tor	Class	1898	850
Berlin	Connor, James William	B.A., Tor	Class., Eng., Hist	1870	1,300
	Forsyth, David	B.A., Tor	Math	1876	1,100
	Sheppard, Frederick William		Eng., Hist	1888	900
	Eby, Minnie Dorothy	M.A., McMaster		1898	600
Bowmanville	Gilfillan, James	B.A., Queen's	Sci	1880	1,200
	Tamblyn, William Ware	M.A., Tor	Class., Eng., Hist., Fr., Ger.	1897	900
	Frost, Francis H	B.A., Tor	Math	1896	900
	Bragg, Thomas George	B.A., Tor	Class., Fr., Ger.	1897	800
Bradford	Foucar, Walter K	B.A., Tor	Fr., Ger. (Interim) Eng., Hist	1901	800
	McLean, Allan			1892	650
	Brown, Duncan A (Interim)			1900	400
Brampton	Fenton, William J	B.A., Tor	Class	1894	1,200
	Galbraith, William John	B.A., Trin.	Fr., Ger.	1887	900
	Howard, Edwy S	B.A., Vic	Eng., Hist	1892	900
	Warren, James M	B.A., Tor	Math	1897	900
	Cosens, Absalom	B.A., Tor	Sci	1897	800
Brighton	Newman, George E	B.A., Queen's	Fr., Gr. (Interim) Eng. Hist.	1896	900
	Burke, Alexander			1895	700
Caledonia	McRitchie, Alexander Robinson	B.A., Tor	Sci	1893	900
	Aubin, Alfred Lerrier	B.A., Oxon	Class	1897	700
	Colling, George F (Interim).	B.A., Tor	Math	1899	650
Campbellford	Shields, Alexander M	B.A., Tor	Eng., Hist	1889	1,100
	Hume, John P	B.A., Queen's		1896	900
	Boyes, Robert		Math	1895	800
Carleton Place	Patterson, William John	M.A., Queen's	Math	1892	1,100
	McIntosh, William Daniel	B.A., Queen's	Eng., Hist	1895	800
	McDonald, Neil			1890	700
	McNeeley, Lizzie (Interim).	B.A., Tor	Eng., Hist	1897	600
Cayuga	Skeele, James Eton	B.A., Tor		1897	950
	Seaton, Edward T	B.A., Queen's	Math	1897	825
	French, Bruce (Interim).	B.A., Tor		1899	500
Colborne	Bellamy, Wesley	B.A., Tor		1890	925
	Foik, Henry J		Fr., Ger. (Interim)	1894	600
Cornwall	Knight, Adolphus Gustavus	B.A., Vic	Class., Eng., Hist	1897	1,300
	Nugent, James			1884	950
	Fitzgerald, Eliza Sophia	B.A., Queen's	Class	1899	1,000
	McLean, Allan Edmund	B.A., Queen's	Fr., Ger. (Interim)	1898	900
	Birchard, Alexander Fraser			1898	700
Deseronto	Smellie, W. K. T	B.A., Tor	Sci	1896	1,150
	Whyte, Robert	B.A., Tor		1896	800

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LIST OF PRINCIPALS AND ASSISTANTS OF HIGH SCHOOLS (INCLUDING COLLEGIATE INSTITUTES) JANUARY, 1901.

High Schools.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
					$
	Stewart, Ernest J (Interim).	B.A., Queen's		1900	550
Dundas	Reid, Joseph	M.A., LL.B., Tor	Class	1893	1,200
	Hill, Richard J			1892	850
	Panton, Agnes Wilkie			1892	300
Dunnville	Cooke, John A	B.A., Queen's	Class	1896	900
	Waines, William L (Interim)		Class.	1899	725
	Robertson, George D			1893	650
Dutton	Taylor, John Andrew	B.A., Queen's	Sci	1898	800
	Anglin, Robert W	M.A., Queen's	Math	1898	650
	Dunkley, Albert W (Interim).	M.A., Queen's	Class	1901	300
	Alexander, Helen Bow (Interim).	B.A., Tor	Eng., Hist., Fr., Ger	1900	450
Elora	McMurchy, Norman	B.A., Tor	Sci	1896	1,000
	Carter, Janet Wishart	M.A., Tor	Fr., Ger	1893	600
	Balls, George Herbert (Interim).	B.A., Tor		1900	600
Essex	Crassweller, Christopher L	B.A., Tor	Math	1888	1,150
	Steer, Albert B	B.A., Tor		1901	600
	Teskey, Edith A	M.A., Tor	Class	1901	650
Fergus	Perry, Peter	M.A., Trin.	Class	1889	1,000
	Campbell, Archibald L			1894	750
	Rowsom, Alice Gertrude	B.A., Tor	Eng., Hist., Fr., Gr	1896	500
Forest	Preston, Thomas	B.A., Tor	Sci. (Interim)	1897	850
	McDougall, Duncan (Interim).	B.A., Tor	Class	1900	650
	Tennant, Adelaide Emma	B.A., Tor	Eng., Hist., Fr., Gr	1898	600
Fort William	Taylor, John J. W	B.A., Tor	Class. (Interim)	1900	900
	Mathews, Stanley W (Interim).	M.A., Queen's	Math	1900	700
Gananoque	Graham, Robert George	B.A., Vic	Math	1894	1,100
	McPherson, Walter E	B.A., Tor.; LL.B., Queen's	Eng., Hist., Fr., Ger	1897	800
	Wilson, W. Asbury (Interim).	B.A., Queen's		1899	600
Georgetown	Coutts, Richard David	B.A., Tor	Class	1897	1,000
	Wetherald, Hubert M			1897	700
	Watterworth Grace (Interim).		Commercial	1900	500
Glencoe	Morrow, John Duncanson	B.A., Tor	Class	1898	850
	Taylor, John Gladstone (Interim).	B.A., Tor	Math	1900	600
	Allin, Elizabeth A	B.A., Tor	Fr., Gr	1899	500
	Harrison, E. Gertrude (Interim).			1900	350
Gravenhurst	Muldrew, William H	B.A., Queen's; D. Pæd., Tor	Math., Sci	1894	1,000
	Downey, Helen E (Interim).	B.A., Tor	Eng., Hist., Fr., Ger	1898	450
Grimsby	Harrison, Charles W	M.A., Vic		1894	800

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Hagersville	Barr, Janet	B.A., Queen's		1900	500
	Jones, George M	B.A., Tor	Eng., Hist., Fr., Gr.	1900	900
	Kaiser, Josse B			1890	750
	Wright, Robert			1896	600
Harriston	Mills, George K	B.A., Tor	Sci	1900	1,050
	Martin, William M (Interim)	B.A., Tor	Class	1899	700
	Nichols, Bessie H (Interim)	B.A., Tor	Eng., Hist., Fr., Gr	1900	500
Hawkesbury	Shotwell, William	B.A., Tor	Fr., Ger (Interim)	1897	1,100
	Wright, William George			1896	700
	Higginson, Maria Adelaide			1897	500
Iroquois	Stanley, Thomas E. A	B.A., Tor	Math	1897	1,000
	Munro, Peter F (Interim)	B.A., Queen's	Class	1900	700
	Smeaton, William (Interim)	B.A., Tor	Sci	1900	700
	Rose, Nellie		Fr., Ger	1898	575
Kemptville	Dillane, William	B.A., Tor		1895	1,100
	Nelson, John	B.A., Queen's	Math	1893	750
	Moore, James R (Interim)	M.A., Queen's	Sci	1901	750
	Smith, Alexander Wm. (Interim)	B.A., Tor		1900	625
Kincardine	Perry, Samuel Walter	B.A., Vic	Class	1890	1,200
	Gray, James	M.A., Tor		1890	700
	Norris, James	M.A., Queen's	Math	1894	900
	Ashwell, Annie Eliza (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1899	600
Leamington	Elliott, John	B.A., Queen's	Eng., Hist., Math	1896	1,100
	Bonis, Harry	B.A., Tor	Class	1899	700
	Robertson, Alexander Morton	M.A., Queen's	Math., Fr., Ger (Interim)	1900	700
	Scratch, Lennie M		Sci	1897	650
Listowel	Phillips, William Alexander	B.A., Tor	Eng., Hist., Fr., Gr	1892	1,000
	Nichol, William Wallace	B.A., Tor	Math	1898	700
	Stoddart, Robert	B.A., Tor	Class	1898	650
Lucan	Stuart, Frederick Alfred	B.A., Tor	Sci	1897	1,000
	Tier, William	M.A., Tor	Math	1896	750
	Carter, Eslie (Interim	B.A., Tor		1900	600
	Wren, John Stewart (Interim)	B.A., Tor	Math	1900	600
Madoc	Watson, Alexander H	B.A., Tor		1889	1,100
	Ivey, Thomas J	M.A., Tor	Sci	1896	750
	Hills, Minnie (Interim)	B.A., Tor	Math	1900	400
Markham	Reed, George Henry	B.A., B.Pæd., Tor	Class	1890	1,000
	Maclean, Goodwin Valentine	B.A., Tor., M.A., Harvard	Math	1899	800
	Annis, Mary	B.A., Tor	Fr., Ger (Interim)	1895	525
	Miller, Nannie M.A		Eng., Hist.	1894	475
	Graham, Louise Hartley (Interim)	M.A., Tor	Sci	1900	550
Meaford	Cornwell, John Leslie	B.A., Tor	Math	1900	1,000
	Huff, Samuel		Sci	1891	750
	Dundas, Arthur A	B.A., Tor		1897	700
	Dingle, Grace Keam	B.A., Tor	Eng., Hist., Fr., Ger	1900	550
Mitchell	Elliot, William	B.A., Tor	Math	1882	1,050

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High Schools.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
					$
	Fry, Frank De Witt	B.A., Tor	Eng., Hist., Fr., Ger.. (Interim).	1895	850
	May, William F			1895	750
Mount Forest	Brethour, John Henry	B.A., Vic	Class	1891	1,100
	Pearson, Alexander	B.A., Tor		1895	750
	Keith, George Walter ..(Interim)	B.A., Tor	Math	1901	650
	Clapp, Florence Hamilton			1900	325
Newburgh	Nesbit, David Ashton	B.A., Queen's		1893	1,000
	Brown, Percy W		Sci	1898	600
	Denyes, James Malcolm (Interim)	B.A., Queen's	Fr., Ger	1898	600
Newcastle	Davidson, Hugh	B.A., Tor		1886	825
	Cathro, Elizabeth Don			1898	400
Newmarket	Coombs, Ernest	M.A., B. Pæd., Tor	Class	1899	1,000
	Hollingshead, John Edwin			1884	700
	Forbes, William B		Sci (Interim)	1898	500
Niagara	Barron, Robert Armour	B.A., Tor	Class., Eng., Hist., Fr., Ger	1900	800
	Blain, Maud E (Interim)			1900	400
Niagara Falls South	Sherin, Frederick	M.A., Vic	Math	1894	1,000
	McManus, Emily	M.A., Queen's	Eng., Hist	1895	600
	Martin, John Moore	B.A., Tor	Sci	1899	600
Norwood	Davidson, John	M.A., LL.B., Vic	Class	1882	1,100
	Graham, Peter Edwin ..(Interim)	B.A., Queen's	Fr., Ger	1898	600
	Merritt, Robert Norris (Interim)	B.A., Tor	Math	1898	600
Oakville	Wellwood, Nesbitt John	B.A., Tor	Math	1877	1,050
	Brunt, Robert Anthony (Interim)	B.A., Tor	Sci	1901	550
Omemee	Jardine, William Wilson	B.A., Tor		1897	800
	Morgan, John James	B.A., Vic	Sci	1896	600
Orangeville	Steele, Alexander	B.A., Tor	Eng. His., Math	1879	1,400
	Clarke, Frederick Hall	B.A., Tor	Fr., Ger. (Interim) Eng. Hist	1895	750
	Lee, Samuel Carson	B.A., Trin	Sci	1897	750
	Will, George E (Interim)	B A., Tor	Class	1900	700
	Torrie, Arthur E (Interim)			1900	450
Oshawa	Smith, Lyman C	B.A., Vic	Class., Eng. Hist	1882	1,300
	Slemon, Edward T	B.A. Vic	Math	1892	1,000
	Riddell, Agnes Rutherford	M.A., Tor	Eng. His., Fr., Ger	1898	600
	Panton, Jessie R			1896	650
	Kinver, Maggie M			1895	500
Paris	Bell, Walter N	B.A., Tor	Class	1898	1,200
	Wightman, Robert	B.A., Tor	Math	1900	650

	Wilson, Thomas Matheson..(Interim).	B.A., Tor	Sci	1898	700
Parkhill	McDougall, Neil	B.A., Tor	Sci. (Interim)	1896	825
	Libby, Minnie Fennessy	B.A., Vic	Eng. Hist	1895	625
	McKinley, James Matthew (Interim).	B.A., Tor	Class	1899	575
Pembroke	Ross, Ralph	B.A., Tor	Class	1895	1,100
	Standing, Thomas W	B.A., Tor	Math	1895	850
	Saunders, William John....(Interim).	M.A., Queen's	Sci	1900	700
	Millar, Margaret Garvin....(Interim)	B.A., Tor		1900	600
Petrolea	Bell, John Johnstone	B.A., Tor		1888	1,200
	Clyde, William	M.A., Queen's		1886	1,050
	Montgomery, William	B.A., Tor	Math	1889	900
	Brown, Harry W	B.A., Tor	Eng. Hist., Fr., Ger	1894	900
Picton	Dobson, Robert	B.A., Vic	Math	1880	1,200
	Morden, Gilbert Walworth	B.A. Queen's	Sci	1895	1,000
	Hendrick, Archer W	B.A., Tor		1897	1,000
	Ackerman, Effie M	B.A., Tor		1897	750
	Dolan, John H	B.A., Queen's	Class	1899	800
Port Arthur	McCulloch, Andrew	M.A., Queen's		1895	1,200
	Morgan, James William		Eng. Hist	1890	1,000
Port Dover	Liddy, William R	B.A., Tor	Sci. (Interim)	1898	800
	Martin, John Strickler	B.A., Tor		1899	600
Port Elgin	Lillie, John Turner	B.A., Vic	Class	1889	1,100
	Innis, Alexander R			1892	750
	Mitchell, John Worth			1897	600
Port Hope	Kirkconnell, Thomas A	B.A., Queen's	Math	1888	1,200
	Caesar, Lawson	B.A., Tor	Class	1900	850
	Weir, Annie	B.A., Tor	Eng. Hist., Fr., Ger	1897	780
	Emery, John W		Sci	1900	800
	Moir, Catharine Elizabeth			1896	600
Port Perry	McBride, Dugald	B.A., Vic	Class, Math	1871	1,300
	Stone, George			1883	850
	MacArthur, Christina M			1895	600
	Underhill, James A			1895	575
Port Rowan	Pugsley, Edmund	B.A, Vic	Sci	1896	850
	Lewis, Jessie Morgan......(Interim).		Fr., Ger	1899	400
Prescott	Rose, Robert Charles	B.A., Tor	Math	1896	1,080
	Chase, Reginald Melville...(Interim).	B.A., Tor	Class	1899	550
	McPherson, Hattie Georgina (Interim).	B.A., Queen's	Fr., Ger	1900	550
Renfrew	McDowell, Charles	B.A., Queen's	Math	1879	1,050
	Bryan, Hugh Wallace	M A., Queen's	Class (Interim)	1897	850
	Ewing, William Campbell	M.A., Queen's	Sci	1896	725
	Davidson, Jean........(Interim).			1899	475
	Moore, Elizabeth Greenwood (Interim).	B.A., Tor	Eng. Hist., Fr., Ger	1900	400
Richmond Hill	Farquharson, Robert Andrew	B.A., Queen's	Eng. Hist., Fr., Ger. (Interim)	1899	900
	Johnston, Frederick James	M.A., Tor	Sci. (Interim)	1898	600
Simcoe	Christie, James Douglas	B.A., Tor	Eng. Hist., Fr., Ger	1889	1,300

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List of Principals and Assistants of High Schools (Including Collegiate Institutes) January, 1901.

High Schools.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
	Power, John Francis	M.A., Queen's	Sci	1897	850
	Galbraith, Robert	B.A., Queen's	Math	1899	800
	Thompson, John Fletcher	B.A., Tor	Class	1899	700
Smith's Falls	Houston, John Arthur	M.A., Trin	Math	1887	1,200
	Stubbs, Samuel James	B.A., Tor. and Queen's	Eng., Hist., (Interim), Class	1897	800
	Morgan, Joseph	B.A., Queen's	Sci. (Interim)	1900	650
	Ryckman, E. Edith (Interim)	B.A., Tor		1899	550
Smithville	Tremeer, James	B.A., Vic	Class	1898	950
	Bridgman, Clara M			1898	400
	Lick, Adalina (Interim)	B.A., Tor	Math	1900	375
Stirling	Kennedy, George E	B A., Vic	Sci. (Interim)	1893	900
	Rutherford, Walter A	M.A., Tor	Class., Eng., Hist., Fr., Gr	1899	750
Streetsville	Cameron, Aldis W	B.A., Tor	Eng., Hist.	1897	800
	White, Edwin T. (Interim)	B.A., Tor	Math	1900	600
Sydenham	Breuls, Ira D.	B.A., Queen's	Sci. (Interim)	1900	900
	Harvey, William Blakely			1889	800
	Spooner, Armon Cortez	B.A., Queen's	Eng., Hist., Fr., Ger	1897	500
Thorold	Bald, William Francis	B.A., LL.B., Tor.	Class	1898	1,000
	Smith, Margaret Hübner			1898	600
	Kennedy, Thomas (Interim)	M.A., Queen's	Math	1900	600
Tilsonburg	Ross, Alexander H. D.	M.A., Queen's	Sci. Math	1898	1,000
	McLennan, Alexander L.	B.A., Queen's		1900	700
	Reid, Minerva E			1900	550
Toronto Junction	Colbeck, Franklin Charles	B.A., Vic	Class., Eng., Hist	1894	1,500
	Gourlay, Richard	B.A., Tor	Class., Math	1893	1,100
	Charles, Henrietta	B.A., Tor	Eng., Hist., Fr., Ger	1900	1,000
	Chrysler, Minton A.	B.A., Tor	Sci	1895	1,000
	Page, Ralph Barlow	B.A., Tor	Eng., Hist., Fr., Ger	1898	650
Trenton	Ingall, Elmer Ellsworth	B.A., Tor		1895	1,025
	Longman, Edwin		Math	1892	750
	Pattee, Ada		Eng., Hist	1889	725
Uxbridge	Park, Henry George	B.A., B.Paed., Tor	Class	1888	1,000
	Sifton, Joseph Wright (Interim)	B.A., Tor	Math	1900	650
	Barr, Lydia			1891	500
	Thibaudeau, Pythagoras (Interim)			1900	500
Vankleek Hill	Jamieson, Thomas	B.A., Vic	Math	1889	1,000
	Might, Lincoln		Sci	1892	700
	Clothier, James O	B.A., Queen's	Fr., Ger. (Interim)	1895	625

Vienna	McLean, Walter Inglis (Interim)	B.A., Tor	Class	1900	500
	Bigg, Edmund M	M.A., Tor	Sci	1901	750
	Malcolm, Wyatt (Interim)			1900	450
Walkerton	Morgan, Joseph	M.A., Tor	Class	1881	1,200
	Witton, James Gayford	B.A., Tor	Math	1895	1,000
	Weidenhammer, Frederick J	B.A., Tor	Fr., Ger	1900	800
	Cheswright, Richard C		Sci	1900	800
Wardsville	Weidenhammer, William B	B.A., Tor	Eng., Hist., Fr., Ger	1896	825
	Hicks, David	B.A., Tor		1901	500
Waterdown	Freeman, John Alexander	B.A., Tor	Class	1893	950
	Ferguson, Miles		Math	1896	600
	Aitchison, Belle			1897	400
Waterford	Mills, John Hudson	M.A., Queen's	Class	1899	1,000
	Saunders, William R (Interim)	B.A., Queen's		1900	600
	Gould, Ethel W (Interim)	B.A., Tor		1900	500
Watford	Potter, Charles	B.A., Tor	Math	1892	1,000
	Race, Wilfrid Ballentine			1893	750
	Williams, Lorne Joseph (Interim)			1898	475
	Bambridge, Celia (Interim)			1900	400
Welland	McCuaig, Herbert M	B.A., Queen's		1891	1,100
	McNiece, James	B.A., Tor	Sci	1896	800
	Laven, Adelaide Frances			1893	550
	Foster, Jessie		Fr., Ger. (Interim)	1899	500
Weston	Forbes, John W	B.A., Tor	Math	1901	800
	Hawkins, Maud Mary (Interim)	B.A., Tor	Fr., Ger	1901	400
	Tennant, Isabella Leathem (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1901	400
Wiarton	Snell, Joseph A	M.A., Queen's	Math	1895	1,050
	Baines, Archibald W	B.A., Trin		1895	700
	Jermyn, Percy T. (Interim)	B.A., Tor		1901	500
Williamstown	MacDonald, James	M.A., Queen's	Class	1897	1,000
	Witheril, Ebenezer Rufus	B.A., Queen's		1895	800
	Millar, Frederick Gourlay (Interim)	B.A., Tor		1900	600

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RECAPITULATION.

Number of Schools. Sex of Teachers.

Collegiate Institutes	38
High Schools	93
	131

Teachers.

Gentlemen	474
Ladies	99
Total	573

Number of Teachers.

Collegiate Institutes.

Principals	38
Assistants	230
Total	268

High Schools.

Principals	93
Assistants	212
Total	305

Grand Total.

Principals	131
Assistants	442
Grand Total	573

Salaries.

Collegiate Institutes.

Highest salary	$2,600
Average " Principals	1,548
" " Assistants	1,004
Average salary	$1,081

High Schools.

Highest salary	$1,500
Average " Principals	1,032
" " Assistants	668
Average salary	$779

Grand Total.

Highest salary	$2,600
Average " Principals	1,182
" " Assistants	843
Average salary	$920

Universities, Etc., of Teachers.

Collegiate Institutes and High Schools.

Toronto	294
Victoria	36
Queen's	100
Trinity	14
McGill	1
McMaster	2
British	3
American	2
Interim Certs	90
Specialists	339
Interim Specialists	100
D. Paed	2
B. Paed	3
Graduates	445
Non-Graduates	128

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APPENDIX O.—*SCHOOL OF PRACTICAL SCIENCE; UNIVERSITY OF TORONTO; COUNCIL OF THE UNIVERSITY OF TORONTO.*

I. Annual Report of the School of Practical Science.

To the Hon. R. Harcourt, M.A., M.P.P., Minister of Education.

Sir:—I have the honor to submit the annual report of the School of Practical Science for the year 1900.

The calendar year not being conterminous with the academic year, this report will cover the second term of the academic year 1899-1900 and the first term of the academic year 1900-1901, except when otherwise stated.

The number of students in attendance at the school was as follows:

School of Science Students.

Taking full courses	2nd Term Session 1899-1900	1st Term Session 1900-1901
I Year	85	111
II Year	45	59
III Year	37	32
IV Year	10	21
Taking partial courses	5	3
	182	226

University Students.

	2nd Term Session 1899-1900	1st Term Session 1900-1901
Arts	21	23

The students of the School of Practical Science taking full courses are required to take University lectures in Mathematics and Physics.

The attendance at these lectures was as follows:

	2nd Term Session 1899-1900	1st Term Session 1900-1901
Mathematics	130	169
Physics	111	137

The fees from the regular and occasional students of the School of Practical Science for the academic year 1899 1900 were $11,324.45 being an increase of $2,711.60 on the fees of the previous year.

Of the above amount $1,690 were paid to the Bursar of the University of Toronto under the authority of an Order-in-Council dated June 18th, 1900, and the remainder $9,634.45 to the Hon. the Provincial Treasurer.

The number of regular students who presented themselves for examination at the annual examinations of the academic year 1899-1900 was one hundred and sixty-one. Of these one hundred and twenty-seven passed.

One candidate for a special certificate passed the final examination.

The number of graduates was thirty-four. The total number of graduates to date is two hundred and seventy.

The following statement shows the geographical distribution of the graduates now living:

	Numbers.	Percentages.
Canada	194	75
United States	56	21
Other Countries	11	4
	261	100

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The number of graduates who proceeded to the degree of B.A.Sc. at the University examinations of 1900 was ten. The total number of graduates who have received the degree of B.A.Sc. is seventy-three.

The total number of graduates who have received the degree of C.E. in the University of Toronto is sixteen.

One graduate has proceeded to the degree of E.E., two to the degree of M.E. (Mining Engineer) and one to the degree M.E. (Mechanical Engineer) in the University of Toronto.

The regular courses in the school are:

1. Civil Engineering (including Sanitary Engineering).
2. Mining Engineering.
3. Mechanical and Electrical Engineering.
4. Architecture.
5. Analytical and Applied Chemistry.

The following statement shows the courses of lectures and practical instruction, the instructors, and the number of students taking the various courses:

SUBJECTS TAUGHT BY THE FACULTY OF THE SCHOOL OF SCIENCE.

Subjects.	Instructors.	Number of Students. 2nd Term. Session 1899-1900.	Number of Students. 1st Term. Session 1900-01.
Organic and inorganic chemistry; Applied chemistry; Assaying	W. H. Ellis, M.A. M.B., Professor; J. W. Bain, B.A. Sc., Demonstrator; A. H. A. Robinson, B. A. Sc., Fellow	174	214
Mineralogy; Petrography; Metallurgy; Mining and ore dressing; German	A. P. Coleman. M.A., Ph.D., Professor; G. R. Mickle, B.A., Lecturer; M. B. Weekes, B.A., Sc., Fellow	139	172
Statics; Dynamics; Strength of materials; Theory of construction; Machine design; Compound stress; Hydraulics; Thermodynamics and theory of the steam engine; French	J. Galbraith, M.A., Professor; J. A. Duff, B.A., Lecturer; R. W. Angus, B.A. Sc., Lecturer; A. H. Harkness, B.A., Sc., Fellow; W. Monds, B.A. Sc. Fellow	180	223
Drawing; Architecture; Plumbing, heating and ventilation; Mortars and cements; Brick and stone masonry	C. H. C. Wright, B.A. Sc., Lecturer; J. T. M. Burnside, B.A.Sc., Fellow	173	207
Surveying; Geodesy and astronomy; Spherical trigonometry; Least squares; Descriptive geometry	L. B. Stewart, D.T.S., Lecturer; A. T. Laing, B.A.Sc., Demonstrator	169	203
Electricity; Magnetism; Dynamo-electrical machinery; Mechanics of machinery; Rigid dynamics	T. R. Rosebrugh, M.A., Lecturer; F. C. Smallpeice, Grad., S.P.S	106	136

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SUBJECTS TAUGHT BY THE FACULTY OF THE UNIVERSITY OF TORONTO.

Subjects.	Instructors.	Number of Students. 2nd Term, Session 1899-1900.	1st Term, Session 1900-01.
Algebra; Euclid; Plane trigonometry; Analytical geometry; Calculus; Astronomy	Alfred Baker, M.A., Professor; A. T. DeLury, B.A., Lecturer; H. J. Dawson, B.A., Fellow	130	169
Sound; Light, heat, electricity and magnetism; Hydrostatics	James London, M.A., LL.D., Professor; W. J. Loudon, B.A., Demonstrator; C. A. Chant, B.A., Lecturer; J. C. McLennan, B.A., Ph.D., Demonstrat.; G. R. Anderson, M.A., Lecture Assistant	111	137

GENERAL REMARKS.

DRAFTING ROOMS.

The attendance at the School this year is so large that it was found necessary to fit up part of the assembly hall as a drafting room, the remainder being used as a lecture room for the same year. Should the first year class next session prove larger than the present one the whole of this room will be required for drafting purposes. The division of the classes rendered necessary by the lack of accommodation in the other laboratories renders the work of instruction both difficult and unsatisfactory. The classes have now grown so large that in order to maintain the efficiency of the work in drafting the services of an additional instructor are necessary.

ANALYTICAL AND APPLIED CHEMISTRY.

It is desirable to draw attention to the great inconvenience resulting from the crowded state of the Chemical Laboratories.

The rooms now in use were designed for classes of about one-third the number of those at present using them. The necessary consequence of this is that either the students are hampered in their work from overcrowding, or, in trying to avoid this, time and energy are wasted by doubling classes and teaching in detachments what might just as well be taught at once.

The construction of the present laboratories is entirely out of date. Many of the rooms were intended for quite other purposes than those for which they are now used, and the problem of ventilation has always been a serious one.

During the present year, a fan and a system of hoods have been fitted up in the east laboratory and are proving of great benefit. Similar improvements as well as a renewal of the floor are urgently needed in the west laboratory.

All such improvements, however, although necessary to make the present conditions endurable cannot obviate the need of the department for a commodious, well planned, modern laboratory, suitable to the number of students and to the character of the work done.

MINERALOGY AND MINING.

The only change made in this department during the year was the appointment of an additional attendant to look after the stamp mill and furnace rooms. There is no room available for further additions to the machinery or appliances. The lecture room for metallurgy is now ventilated but cannot accommodate the large class (the maximum number it will seat being 44 whereas there are 60 in one class) and consequently it has been necessary to give these lectures in another part of the building in a room not suited or the purpose.

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The great necessity is additional room. Additions requiring more floor space should be made to the metallurgical plant, more floor space is also needed in the museum to exhibit material already on hand, and a great increase in the size of the lecture room is required. The floors in the museum and lecture rooms should be repaired.

ELECTRICAL LABORATORY.

Two batteries of storage cells have been set up in a suitable place and connected to separate switch boards so that they are now available for a variety of useful purposes such as photometry and the calibration of electrical measuring instruments. Three ammeters, two voltmeters and a wattmeter of which the laboratory stood in need have been purchased from the Weston Co. A single-phase, alternating current motor with condenser for starting have been added to the dynamo room, and we have also to record the gift by the Canadian General Electric Co. of a Thomson recording wattmeter. The most pressing requirements are now a photometer room, additional dynamos, additions to our set of measuring instruments and cases for instruments.

STEAM ENGINE AND HYDRAULIC LABORATORIES.

Additional injectors of different types should be installed for testing purposes.

A good centrifugal pump with means of varying the speed and measuring the power is also required.

TESTS OF MATERIALS.

A room fitted up with vice benches, forges and a small crucible furnace for the purpose of training students in making easy and short tests of metals and alloys should be provided with as little delay as possible.

SURVEYING, PRACTICAL ASTRONOMY, ETC.

The surveying equipment has been increased by seven Surveyors' Compasses and over a dozen chains, tapes, etc. This was necessitated by the increase in the number of students taking field work, which work can now be carried on without duplicating instruction or having too large a number in a party in the field.

In the event of a trigonometric survey of Canada being inaugurated—which will probably be the case in the near future if Canada is to follow the lead of other civilized countries—the result will be that a number of students will turn their attention to higher astronomical and geodetic work. The equipment of the School for such work is quite inadequate at present and should be supplemented by an astronomical transit instrument and a zenith telescope, a small building should be erected for their reception to serve as an observatory. The total cost would be about two thousand dollars, but the School would thus be placed in a position to give instruction in those subjects, which at present it is not prepared to give.

NEW BUILDING.

If the School is to fulfil its functions properly, additional space is absolutely necessary. The recommendations made in the last annual report must remain practically unchanged after a year's further consideration of the subject. They were as follows:

It is proposed that a new building be erected on the lot or lots between the present School of Science grounds and College Street. This may involve the removal of Old Wycliffe College, now occupied by the Toronto Technical School. All the work now done in the older part of the School of Practical Science building, viz., Analytical and Applied Chemistry, Mineralogy, Geology and Mining should be removed to the new building and the space thus vacated utilized for the expansion of the departments which remain. The new building should provide for the expansion in the subjects allotted to it.

It might be possible to take joint action with the University authorities and erect a building which would serve the requirements of the Arts course in Mineralogy and Geology as well as those of the School of Science in the subjects above mentioned,

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It would be well if the ground south and south-east of the School of Science and north of College Street were reserved for the purposes of Chemistry, Mineralogy, Geology and Mining.

In addition it would be well to consider the advisability of providing in the new building for a provincial museum in geology, mineralogy, mining and applied chemistry. The collections belonging to the Province, to the University and to the School of Science might form the necleus of such a museum. Strangers and others seeking information on these subjects ought not to be forced to undergo the trouble and loss of time consequent upon visiting the separate institutions in which these collections are now housed.

J. GALBRAITH,
Principal.

Toronto, December, 1900.

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2. Annual Report of the University of Toronto.

To His Honour, the Honourable Sir Oliver Mowat, K. C. M. G., Lieutenant-Governor of the Province of Ontario, Visitor of the University of Toronto.

May it Please Your Honour:

The Chancellor, Vice-Chancellor and members of the Senate of the University of Toronto have the honor to present their report upon the condition and progress of the University for the year 1899-1900.

The following tabulated statement of the admission to degrees, and *ad eundem statum*, and of the members who matriculated in the different faculties from June, 1899, to June, 1900, is submitted:—

Law—	
Matriculation	8
Degree of LL.B.	2
Degree of LL.D.	1
Medicine—	
Matriculation	84
Ad eundem statum from the College of Physicians and Surgeons	11
Ad eundem statum, from other Universities	3
Degree of M.B.	45
Degree of M.D.	—
Arts—	
Matriculation	252
Ad eundem statum, from other Universities	6
Degree of B. A.	147
Degree of M. A.	16
Degree of Ph. D.	2
Agriculture—	
Degree of B. S. A.	18
Pedagogy—	
Degree of D. Pæd.	—
Dentistry—	
Matriculation	10
Ad eundem statum, from the R. C. D. S.	31
Degree of D. D. S.	72
Music—	
Matriculation	4
Degree of Mus. Bac.	3
Pharmacy—	
Matriculation	2
Ad eundem statum, from the Ontario College of Pharmacy	32
Degree of Phm. B	34
Applied Science -	
Degree of B. A. Sc.	10
Engineering—	
Civil Engineering	2
Mechanical Engineering	1
Mining Engineering	1

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During the year thirteen hundred and thirteen candidates were examined in the different faculties and departments, as follows:

Faculty of Law	10
Faculty of Medicine	243
Faculty of Arts	871
Department of Agriculture	18
Department of Pedagogy	—
Department of Dentistry	118
Department of Music	5
Department of Pharmacy	34
Department of Applied Science	10
Department of Engineering	4
Total	1313

CHARLES MOSS,
Vice-Chancellor.

TORONTO, December 3rd, 1900.

3. Annual Report of the Council of the University of Toronto.

To His Honour, the Honourable Sir Oliver Mowat, K. C. M. G., Lieutenant-Governor of the Province of Ontario, Visitor of the University of Toronto.

May it Please Your Honour:

The Council of the University of Toronto begs leave to present to Your Honour the following report for the academic year ending with the 30th June, 1900:—

In view of the present and prospective needs of the University as regards those branches of learning, the teaching of which, under the Federation Act, is entrusted to the University of Toronto, the Council deems it expedient to set forth, somewhat in detail, the history of the development of this work, with special reference to the subjects of physics, biology, physiology, chemistry, mineralogy and geology, and psychology.

The movement in favor of practical instruction in the sciences may be said to have begun in 1874 with the adoption of a resolution, by the Senate of the University, in favor of making laboratory work obligatory in the undergraduate science course. In pursuance of this policy it became necessary to establish and equip laboratories which would afford facilities for this purpose.

No step, however, was taken in this direction until December, 1875, when a report by the undersigned, regarding the organization of the School of Practical Science and the laboratories referred to, was made to the Government, and adopted on the recommendation of Mr. Crooks, then Minister of Education. Acting along the lines of this report, the Government proceeded to erect a building for the accommodation of the School of Practical Science, and in 1878 the necessary University funds were appropriated for the equipment of laboratories. Three of these laboratories, viz., the Chemical, Mineralogical and Geological, and Biological Laboratories, were installed in the School of Science Building, whilst the Physical Laboratory was accommodated in the Main Building, in the rooms formerly occupied by the Chemical Department.

The accommodation thus provided very soon became quite inadequate, owing to the rapid development of those departments, and new arrangements became necessary. This was especially the case with respect to Biology, which in 1888 was transferred to the new building, at present constituting the east wing of the existing Biological Building. In 1890, partly in consequence of the fire, this building was further enlarged to afford accommodation for the Museum of Natural History. In this new portion place was found for the Primary Medical Department, and to it also was transferred, from the School of Practical Science the Department of Mineralogy and Geology. In 1889 the Physiological Laboratory was established in the east wing of the Biological Building. In 1892 the Psychological Laboratory was established in the Main Building, in rooms formerly occupied by the Biological Department. Finally, in 1894, the Chemical Department was transferred from the School of Practical Science to the new Chemical Building.

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Some idea of the magnitude of the work to be overtaken on the practical side of science instruction in the University may be obtained from the following statement as to the number of students receiving laboratory instruction during the session of 1899-1900:

	Number of Students.
Physical Laboratory	176
Chemical "	237
Mineralogical "	25
Biological "	215
Psychological "	44
Physiological "	68

The number for the present session of 1900-1901 shows in every case a considerable increase over the above figures.

It should be noted that the above laboratories are required, under the curriculum, to afford facilities for the instruction of undergraduates, and also for the prosecution of post-graduate work. By reference to the appended letters from the professors in charge of the laboratories, it will be seen that there is a pressing necessity for more liberal allowances for annual maintenance than have been possible for the last four years, in consequence of the straightened financial circumstances of the University.

In the case of certain laboratories, however, the accommodation and equipment are quite inadequate for the work to be done. Indeed, in the Department of Mineralogy and Geology, not only is a new building and equipment required, but also a reorganization of the teaching staff. In fairness to the present temporary staff in this department, it should be noted that, notwithstanding the absence of proper facilities, the work done has been of a very creditable character. The Council has already taken occasion in former reports to direct the attention of your Honour to the pressing necessities of this department. In consideration of the relationship which the subjects of Mineralogy and Geology bear to the development of the mineral resources of the Province, the Council is of the opinion that these claims should no longer be postponed. The Council would suggest, as the most economical plan for meeting the requirements of the case, some form of co-operation between the University and the School of Practical Science, by which the Mineralogical and Geological Departments of both institutions could be provided for in one building, and their collections of specimens united in a common museum.

Since its organization, in 1889, the work of the Physiological Laboratory has been carried on in certain rooms in the Biological Building. The requirements of both Biology and Physiology, as regards increased accomodation, render it necessary to make provision elsewhere for the subject of Physiology. This necessity has arisen in part from the recent change in the method of instruction of medical students, by which laboratory instruction in Physiology is now required in the second year of the Primary Course.

The Physical Laboratory is also in urgent need of extended accommodation. Its work is carried on at present in a number of rooms in the main building, which are unsuitable, having been designed originally for other purposes. Notwithstanding the addition of several rooms from the Residence wing, the space now available is quite inadequate to accommodate properly the large numbers of students who require to take laboratory work in Physics. In this connection it should be remembered that the numbers have of late years been largely increased by the accession of students of Engineering and Medicine, all of whom are required to take Physics as part of their course. Unless the work in Physics is to be still further cramped and impeded, it will be necessary at an early date to erect a separate building especially designed for the purposes of this department. This building should be a plain and substantial structure somewhat in the style of the Chemical Building, and its site should be convenient to that of the other science buildings.

In the Department of Psychology there are at present upwards of 200 students, of whom 64 receive laboratory instruction. The work of the Psychological Laboratory is now carried on in several rooms dispersed over the Main Building, while it has been necessary to utilize the west examination hall as a lecture room—a room quite unsuited to the purpose, owing to its defective acoustic properties. These difficulties could be overcome by the erection of the proposed Physical Laboratory, since the space occupied at present by Physics in the main building would then be available for Psychology and

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for other purposes. In like manner, if the proposed changes as regards Physiology and Mineralogy and Geology were made, space would be available in the Biological Building for the projected Botanical Museum and also for the further development of Vegetable Physiology. In the interests of Forestry it is desirable that the Biological Department should be in a position to furnish facilities for investigations relating thereto both on the Botanical and on the Zoological side.

In the last report of the Council attention was directed to the necessity of providing one or two lecture rooms, similar to those in the Chemical and Biological Buildings, with seating capacity for three or four hundred students, and suitable for the accommodation of the larger classes in various subjects. The Council desires again to direct the attention of your Honour to this matter.

A department of University work which is important, both as regards the present organization of the institution and its future progress is that of post-graduate study. A movement in this direction was inaugurated through the establishment of the fellowship system in 1882. The object of that system was to encourage post-graduate study, and at the same time to obtain assistance in tutorial work. So far as post-graduate study was concerned the system proved unsatisfactory, owing to the excessive amount of tutorial duties laid upon the incumbents of the fellowships, and also owing to the lack of a definite object, such as is afforded, under present conditions, by the degree of Ph.D.

The desirability of establishing this degree was affirmed by the Senate in 1883, but owing to various circumstances final action in the matter was not taken until 1897. Notwithstanding the fears expressed by some, it is gratifying to report that a marked stimulus has been given to post-graduate study by the establishment of this degree. The number of graduates proceeding to the degree of Ph.D. has increased from 14 in 1899–00 to 21 during the present session.

The Council is gratified to report that the periodical entitled "University Studies," established in 1897 for the purpose of affording a medium for the publication of papers of original research by members of the Faculty and graduate students, is meeting with continued success. Up to the present time the series published includes 17 papers. This publication has proved of great advantage to the University library, owing to the fact that valuable scientific periodicals from various countries are received in exchange for it; and incidentally the reputation of the University in the advancement of scientific knowledge has been largely extended.

The attention of the Council has been directed of late to the importance of the subject of higher commercial education in its relation to the development of the commerce and industry of the country. It has been suggested that the Council should direct the attention of undergraduates of marked business capacity to the desirability of entering upon a commercial career. With this suggestion the Council is fully in accord. Within the University, in the various courses of study, are to be found all the means required to fit the student for entering upon such a career. In the Political Science course especially it is intended in the future to give increased attention to the investigation of commercial problems, and in this connection, it may be stated that arrangements are in progress for the delivery of a course of lectures upon Economic Geography. A beginning has already been made towards a collection of statistical documents and other material relating to the resources and commerce of foreign countries, as well as of Canada. This collection is being properly arranged and indexed, and will be placed at the disposal of those who are interested.

The attention of your Honour is directed to the following letters addressed to the President by the heads of various departments regarding the requirements for the more efficient teaching of the various subjects of study:—

THE PRESIDENT,
University of Toronto.

My Dear President:

I beg to submit my report on the present condition of the department under my charge.

In view of the proposed amalgamation of the Trinity Medical Faculty with that of the University, I call attention to the fact that my lecture room is already filled by the Arts and Medical students in attendance on the elementary lectures on Biology. Should

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the amalgamation take place it will be necessary to separate the Medical students from the Arts, and to deliver a course specially suited to the former, which I shall be quite prepared to do to facilitate the proposed fusion.

Another result will be the inadequacy of the Elementary Laboratory to deal with any larger classes of Medical students than we have at present. I think we must in any case consider the necessity of offering additional practical instruction to the Medical classes in Elementary Biology and Histology. Two hours a week is inadequate. I have not sufficiently considered how this should be met, but I believe with additional class assistance and apparatus it will not prove insurmountable. As far as the First and Second Year Arts students' requirements go, the laboratory is sufficiently large.

The same statement, however, cannot be made with regard to the laboratories originally reserved for Third and Fourth Year Arts students. In all 20 places were provided (12 in the third year and 8 in the fourth year), but since '93–94, when there were 37 students, I have been obliged to encroach on the Physiological Laboratory for the accommodation of the Fourth Year students. During the last two years it would have been possible to replace the Fourth Year students in their own laboratory, had not special arrangements in connection with their work been made in the Physiological Laboratory, which made it undesirable to move them, especially in view of another immediate rise in numbers. It may be, of course, that the fall is due to an increasing number of students entering the professions direct from the High Schools, but the indications from the lower years are that the number may again rise.

As long as Professor Macallum's practical classes in Physiology only dealt with the Fourth Year students in Arts, their doing their Morphological work in the same laboratory was not productive of much difficulty, but the recent extension to the large medical class of the second year of instruction in Practical Physiology produces a difficulty which will become more formidable with the larger class which will have to be instructed next year. Professor MacCallum, has, I understand, already addressed you on this subject.

Some further accommodation is necessary for practical work in Botany. If, as I understand is possible, the Bacteriologist to the Provincial Board of Health is obliged to move out of the room he at present occupies on account of its inadequate size, the room in question may be devoted to this purpose.

I am gratified to be able to report that important additions have been made to the Biological Museum in the past year. For the proper display of these it will be necessary to complete the plan for cases originally proposed. It is also much to be desired that the portion of the museum intended to be devoted to botany should be equipped as soon as possible. The necessary preliminary to this is of course the disposition elsewhere of the Ferrier Mineral collection.

I have to report that considerable progress has been made since September in the preparation of a museum catalogue—even more necessary for a museum than for a library. This has been possible by the employment of Mr. Cornish to do the routine work. After our collections have been catalogued I intend to propose that there should be a museum assistant, capable of adding to the preparations of special educational value. I have myself devoted a very great deal of time to this work, but it should be in the hands of some one who can devote himself exclusively to it.

Yours truly,

R. RAMSAY WRIGHT.

Biological Department,
University of Toronto, Jan. 8th, 1901.

PRESIDENT LOUDON, M.A., LL.D.,
University of Toronto.

Dear Mr. President,—Permit me to bring to your attention the question of further accommodation of students in the Department of Physiology.

Since 1889 the teaching in Physiology has been conducted in the Biological Department building, the accommodation in which up to 1898-9 proved to be adequate. In addition to lectures the course of instruction embraced demonstrations given in the large lecture room, attended by the students of Medicine of the Second Year and laboratory work taken only by the Honour Arts students of the Fourth Year Natural Science Course in the large laboratory in the southwestern corner of the Department Building.

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In 1898 9 it was decided to alter the course of instruction for medical students in order to bring it in accord with University requirements here and elsewhere and with the principle that all science teaching should be as practical as the subject would permit. In consequence the room that was used for Practical Physiology for honour students in natural science had to be employed as the only available one for holding classes of medical students in Practical Physiology, although it is manifestly too small for the purpose. This room will accommodate about from twenty to twenty-five students working together. Last session there were fifty-nine students in the class and this compelled a division of the class into three groups and a corresponding increase in the hours of instruction given by myself and the Assistant Demonstrator. This session there are one hundred and three students in the class, and one hundred are taking practical instruction in Physiology in groups of from twenty-four to twenty-six, each of which is too large for the room, but as it is impossible to find time for other groups these cannot be constituted of a smaller number of students. It must also be noted that the room is now used for instruction in Practical Morphology of Fourth Year Natural Science students and the tables and other fixtures placed for them in the room diminishes the space which would otherwise be available.

The difficulty of lack of accommodation will be greater next session when the class in Practical Physiology will contain about one hundred and twenty students.

The fact is that the attendance in the Biological Department has greatly outgrown the accommodation of the building and what was sufficient for the classes in Biology and Physiology together appears to be required for Biology alone. There is, consequently, no possibility of making additional accommodation in the Biological Building for the greatly increased attendance in Physiology.

I would ask, therefore, that a new Physiological Laboratory be provided.

Yours sincerely,

A. B. MACALLUM.

The University of Toronto,
January 30th, 1901.

J. LOUDON, LL.D.,
President of the University of Toronto.

SIR,—The additional accommodation assigned to the Department of Psychology in the old Residence Building is found to be of the greatest service, especially as regards the work of graduate students. On the other hand the extension has entailed a good deal of expense, since the desirability of conducting the various researches independently and simultaneously has made the acquisition of additional apparatus necessary. In view of these circumstances, I think it not unreasonable to ask this year for a larger allowance than usual. The increase will, however, be only temporary, since it is due solely to the altered conditions and the necessity of fitting up the new rooms. I ask therefore, for this year, for five hundred dollars, out of which, as formerly, I propose to pay my second assistant.

In asking for this amount I should like to direct the attention of the Goverment to the fact that in almost every great University the establishment of a Psychological Laboratory has been found a necessity, and large sums have been spent for this purpose in Europe as well as on this continent. I may mention in this connection the Universities of Harvard, Yale, Cornell, Columbia, Chicago, Pennsylvania, Wisconsin, Clark, Leland Stanford, etc. The annual allowance for maintenance in these institutions is very much higher than in our own. E. g., in the Psychological Laboratory of Cornell University, where only a limited number of students (about 25) are accepted, the allowance is $800 per annum, and this after $6000.00 has been spent for the equipment of the rooms. It might not be superfluous to mention here that the number of students taking Psychology in our own University for the present year considerably exceeds 200. There are over 150 pass students, 57 honour students, and 7 graduates (not including a few who do extra-mural work.)

It is not my place to make a comparison between the laboratories of other universities and that of our own with regard to the efficiency of the work done. But the number of graduates from our own laboratory who have found positions on the faculties

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of other academic institutions does not seem to indicate any essential inferiority in our work, nor is this indicated by the spirit in which our publications are received abroad. The most cursory glance must show that even if we are in some respects outstripped by such institutions as Harvard and Cornell, with their elaborate laboratory equipment, we are not behind them in proportion to the expenditure respectively involved. What has been said for years of the University of Toronto as a whole may fairly be applied to our Psychological Laboratory: *We compete with fair success with the best institutions on this continent, although we are compelled to carry on the work with less than one half the financial means.*

On this occasion I may be allowed to make a few remarks with regard to the place of research in university work. A great national or provincial university should not simply exist for the purpose of *teaching* a knowledge acquired somewhere else, but it should take an active part in the *advancement* of knowledge. Research is therefore in our days the very life and soul of a university. Without research, without an active participation in the progress of science, a university necessarily degenerates into a species of mediæval institution. The efficiency of a university should be measured not merely by the number of students in attendance—for that is subject to many influences—nor by the extent and splendor of popular display, nor the amount of interest taken by the public in university affairs (however helpful the latter may be to the institution), but rather by the amount accomplished in educational work and research work of a positive and lasting value.

In this respect, I believe that the University of Toronto, in all its Departments, has been more successful during the last ten years than at any other period of its history; nor does it lose anything by comparison with other institutions in this country. If this is better known abroad than in Toronto, it is not the fault of the University. I may be allowed in this connection to mention one fact: The publications by members of the staff, by graduates, and even by advanced undergraduate students of the University are well known in the United States, very well known and carefully reviewed and commented on in France and Germany; but they are scarcely noticed here in Canada.

It is true that the positive and lasting value of certain kinds of work is sometimes only recognized decades afterwards. It is to be hoped that a time is coming when the work of the University, done in these years, will find more adequate appreciation than is the case at present, and when the merits of the present head of the institution, who, in spite of the serious financial embarrassments, has done more than ever was accomplished hitherto to bring the University up to the level of the best institutions of this continent, will find due recognition.

I am very well aware that the Government and our colleagues on the faculty are fully in accord with this view, and that you, Mr. President, have, during all the years of your presidency, done everything possible to foster and advance this phase of university work. I venture to mention this matter, however, because it seems to me that correct views regarding the essential aims of academic work are not sufficiently prevalent among the public at large, by whom university matters are so often discussed. The disposition in this country appears too general to look upon the university as a greater *high school* and to lay too much stress on the *teaching* side and too little on the *research* side of *university work.* The outcome of such views is the one-sided ideal of the *great teacher*, who draws the student up to his own level, and makes him "almost as perfect" as he is himself. This is, I venture to think, an absolutely inadequate pedagogical ideal, which, even when realized, precludes progress, for *all real intellectual and moral progress depends on the pupil excelling his master in some respects.* We should always try to put our students finally on a somewhat higher level than we ourselves occupy, so that they may go on, where we are obliged to stop. But this can be accomplished only when we cause our advanced and graduate students not only to perform exercises for becoming acquainted with the results and methods of the various branches of learning, but also afford them the opportunity of taking some part in the actual advance of their subject. In this sense research work is not only of a practical, but also of the highest educational value. It is one of the most essential factors in the education of the race.

What our University needs most of all is: greater facilities for the prosecution of research work, that is, more money and more time for the members of the staff who are at present overburdened with lectures.

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I am well aware of the financial difficulties with which our University has had to cope, and with which indeed it is still face to face, and I desire on behalf of the Psychological Department to render my sincere thanks to the Government and to you, Mr. President, for what has been done in the past, but in view of the present needs, and having regard to all circumstances, I trust that the Government will not be disposed to consider as exhorbitant my request for increased financial support.

I have the honour to be, Mr. President,

Your obedient servant,

A. KIRSCHMANN.

UNIVERSITY OF TORONTO,
PSYCHOLOGICAL DEPARTMENT,
Jan. 5th, 1901.

The President, University of Toronto.

Dear Mr. President,—I beg to submit the following statement regarding the needs of the department of Minerology and Geology:—

From the point of view of Applied Science, Toronto University is fairly well provided for in the department of Mining Engineering, having four laboratories: for blowpipe work, assaying, milling, and rock section cutting; a good stock of microscopes and thin sections; and a museum containing collections of minerals, rocks, fossils and ores, as well as students' collections for teaching purposes. The staff consists of a professor of Geology, a lecturer on mining and ore dressing, a demonstrator and a fellow, with two assistants for the management of the laboratories; and the chemical side of the work is provided for by the professor of Chemistry and his assistants.

On the Arts side, however, the Geological Department has very inadequate accommodation, there being only two basement rooms for laboratory purposes, and two small rooms in different stories of the Biological Building for all other purposes of teaching and storage. The collections for use in teaching are meagre, and the excellent Ferrier collection of minerals, being in the Biological Museum, is not readily available for students' use. There is no serviceable microscopes for petrological work, only a very poor equipment of instruments for minerology, and scarcely any maps and models of a modern kind.

In a properly equipped geological department of a great University there should be provision for the teaching of Geology in all its branches, dynmanical, structural, stratigraphical, historical; for minerology, crystallography and megascopic and microscopic lithology; for palaeontology, vertebrate and invertebrate, as well as palaeobotany; for physiography and geography; and for meteorology.

To cover this ground the staff consists at present of an Acting Professor, most of whose time is of necessity devoted to work in applied science, and an Acting Demonstrator. The whole amount paid as salaries in the department is $1,250. By making use of the School of Science equipment the teaching of the subjects of the department is to some extent helped out, and an attempt is made to give a fairly complete course in the subject, so that the small number of honor students may not suffer.

If it be admitted that Geology and its related sciences are as important as any other department of science to the Arts student, the staff must be greatly increased, space must be provided for lecture rooms and laboratories, a proper equipment of instruments, maps, etc., must be furnished, and a museum must be arranged for. To do all this in the most economical way the staff and equipment of the Geological Department in the School of Science should be combined with that of the University; and in arranging for a museum the needs of the Bureau of Mines should also be taken into account. The School of Science is already greatly overcrowded and threatens to become more so in the future, making a new building imperative. Plans for the teaching of Geology in the University should take the whole subject into consideration.

To carry on the work satisfactorily there should be at least a staff consisting of a professor of Geology, an assistant professor or lecturer in Mineralogy, an assistant professor or lecturer in Palaeontology, and two demonstrators, with probably one or two fellows, to have charge of laboratory work and aid in the management of the collections in

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the museum. Three of the staff mentioned are already provided for in the School of Science, a professor of Geology, a demonstrator and a fellow; and one of the new men suggested, the assistant professor or lecturer in Mineralogy, would be of great assistance for Applied Science work; so that in reality only the requirements of palaeontology need stand as a charge against the Arts department. It is not intended here to go into details as to a building suitable to include the whole work of Geology, Mineralogy and Palaeontology, but there should be space for four or five lecture rooms, including a theatre for large classes; at least six laboratories, including room for stamp mill, metallurgical and assay plants: two or three study rooms; two or three preparing rooms; two private laboratories; and five private rooms; as well as cloak rooms and lavatories. Large additions should be made to the apparatus, maps and models, and to the collections of rocks and fossils; while space should be provided for the display of much material from the Province of Ontario, now stored out of sight. The museum should be made a real provincial museum, as complete as possible in its collections of the minerals, ores, rocks and fossils of Ontario, and serving the purposes of the Bureau of Mines as well as those of the University. It is discreditable that the rich Province of Ontario should have in its capital city no museum to which investors and others interested in our mineral products, daily increasing in importance, can be referred as containing a fairly complete c lection illustrating our mineral resources.

Yours sincerely,

A. P. Coleman.

School of Science, January 31st, 1901.

To the President,
The University of Toronto.

Sir:—

I have the honour to report on the additional requirements of the Department of Chemistry under my charge.

There has been a steady increase in the number of laboratory students during the past few years—41 since last session—and this will no doubt continue. The first year in medicine has grown enormously, and cannot be accommodated in the medical laboratory. Its instruction is at present carried on at great inconvenience, one division of the class having to use the laboratory on the lower floor. The appointment of two or more class-assistants, graduates in Arts, or senior students, at a small salary—say $50.00—would greatly facilitate the work in this department.

The following items are urgently required:—

1. *Storage Cells.*—The present ones put in when the building was constructed, being now entirely useless.

2. *Blinds.*—For lecture room.

3. *A Sink and Tables.*—For the acid room, where all reagents are prepared.

The total cost would be about $600.00.

The four hundred dollars allowed for specimens, glassware and chemicals is utterly inadequate to the needs of the department. A complete series of lecture specimens and jars is required, both of inorganic and of organic substances. The present set is almost useless for teaching purposes, and wholly incomplete, and the student has no opportunity of familiarizing himself with the appearance of the substances he continually hears referred to. An increased grant for glassware and apparatus generally is needed if the department is to occupy its proper position among the laboratories of sister institutions.

A sum of at least $800.00 a year would be required for this purpose.

The appointment of an Associate-Professor of Physical Chemistry, and the increase in the number of students taking that subject, necessitates a considerable initial expenditure to suitably furnish and equip the rooms in the basement which it has been decided to use as Physico-Chemical Laboratories. After going carefully over the rooms in question and considering the matter of equipment in consultation with Dr. Miller, I consider the sum of $1,600 00 is the lowest figure for which the apartments could be rendered suitable for the systematic instruction in that branch of the subject. The initial and im

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mediately necessary cost would be $1,200.00; the remaining fixtures, amounting to $400.00, might stand over for a year An appropriation is also essential for apparatus for the sub-department of Physical Chemistry. A sum of $200.00 per anunm would in the meantime suffice.

I have the honour to be, sir, your obedient servant,

W. R. LANG,
Professor of Chemistry.

January, 1901.

Hereto is appended the list of the Faculties in Arts and Medicine, together with the number of students in the various branches :—

STAFF, 1899-1900.

Faculties of Arts and Law.

President, James Loudon, M.A., LL.D.

Physics—
Professor, James Loudon, M.A., LL.D.
Demonstrator, W. J. Loudon, B.A.
Lecturer, C. A. Chant, B.A.
Demonstrator, J. C. McLennan, B.A., Ph.D.
Lecture Assistant, G. R. Anderson, M.A.

Mathematics—
Professor, Alfred Baker, M A.
Lecturer, A. T. De Luro, B.A.
Fellow, H. J. Dawson, B.A.

Chemistry—
Professor, W. H. Pike, M.A., Ph.D.
Lecturer, W. L. Miller, B.A., Ph.D.
Lecturer, F. J. Smale, B.A., Ph.D.
Assistant, F. B. Allan, B.A.
Lecture Assistant, F. B. Kenrick, B.A., Ph.D.
Fellow, Miss C. C. Benson, B.A.

Biology—
Professor, R. Ramsay Wright, M.A., B. Sc.
Lecturer, E. C. Jeffrey, B.A., Ph.D.
Assistant-Demonstrator, R. R. Bensley, B.A., M.B.
Fellow, J. Stafford, B.A., Ph. D.
Assistant in Botany, R. B. Thomson, B.A.
Assistant in Zoology, F. H. Scott, B.A., Ph.D.
" " B. A. Cohoe, B.A.

Physiology—
Associate-Professor, A. B. Macallum, M.A., M.B., Ph.D.

Mineralogy and Geology—
Acting-Professor, A. P. Coleman, M.A., Ph.D.
Instructor, W. A. Parks, B.A.

Comparative Philology—
Professor, Maurice Hutton, M.A.

History and Ethnology—
Professor, G. M. Wrong, M.A.

Political Economy and Constitutional History—
Professor, James Mavor.
Instructor, S. M. Wickett, B.A., Ph.D.
Mackenzie Fellow in Political Science, D. McFayden, B.A.
Mackenzie Fellow in Political Science, T. A. Russell, B.A.

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STAFF, 1899-1901.

Faculties of Arts and Law.—Con.

Philosophy—

Professor of History of Philosophy, J. G. Hume, M.A., Ph.D
Associate-Professor, A. Kirschmann, Ph.D.
Lecturer, F. Tracey, B.A., Ph.D.
Instructor, A. H. Abbott, B.A.

Italian and Spanish—

Associate-Professor, W. H. Fraser, B.A.
Instructor in Spanish, P. Toews, M.A., Ph.D.
Instructor in Italian, E. J. Sacco.

Roman Law, General Jurisprudence and History of English Law—

Professor, A. H.F. Lefroy, M.A.

Constitutional and International Law—

Professor, Hon. David Mills, LL.B.

The following tables exhibit the numbers attending the pass and honor lectures in University subjects. In no case do the numbers given for pass include honor students:

PASS.

Subjects.	Mathematics.	Physics.	Chemistry.	Biology.	Mineralogy and Geology.	Philosophy.	Logic.	Political Science.	History.
Arts—First Year	141	38	.....	85	.....	.....	.....	.....	.....
Arts—Second Year	.....	5	7	.....	55	145	130	.....	78
Arts—Third Year	.....	5	.....	.....	.....	.....	.....	27	31
Arts—Fourth Year	31	.....	.....	.....	.....	21	.....	41	24
Medicine—First Year	.....	95	97	103	.....	.....	.....	.....	.....
Medicine—Second Year	.....	.....	55	59	.....	.....	.....	.....	.....
School of Practical Science	91	131	1	.....	.....	.....	.....	.....	.....
Totals	263	274	160	247	55	166	130	68	133

HONOR.

Subjects.	Mathematics.	Physics.	Chemistry.	Biology.	Physiology.	Mineralogy and Geology.	Philosophy.	Political Science.	History.	Italian.	Spanish.	Phonetics.
Arts—First Year	29	49	60	27	....	....	....	....	....	34	13	38
Arts—Second Year	54	25	30	6	....	8	14	28	38	30	7	....
Arts—Third Year	13	15	12	8	....	11	16	18	45	12	3	....
Arts—Fourth Year	7	7	8	9	....	4	21	18	46	13	5	....
Arts—Graduates	1	....	....	1	....	....	2	....	....	....	....	....
Arts—Ph.D. Students	2	3	1	2	....	2	3	....	1	....	....	....
Medicine—First Year	....	....	....	....	103	....	....	....	....	....	....	....
Medicine—Second Year	....	....	....	....	59	....	....	....	....	....	....	....
Totals	106	99	111	53	162	25	56	64	130	89	28	38

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The following table exhibits the numbers taking the practical work in the laboratories :—

Laboratories.	Physical.	Chemical.	Mineralogical.	Biological.	Physiological.	Psychological.
Arts—First Year	32	20	....	27	....	....
Arts—Second Year	11	32	8	6	....	....
Arts—Third Year	13	12	11	8	....	16
Arts—Fourth Year	7	10	4	9	9	23
Arts—Graduates	....	2	....	1	....	2
Arts—Ph.D. Students	3	1	2	2	....	3
Medicine—First Year	....	96	....	103	....	....
Medicine—Second Year	....	64	....	59	59	....
School of Science—First Year	47	....	....	....	....	....
School of Science—Second Year	36	....	....	....	....	....
School of Science—Third Year	22	....	....	....	....	....
Totals	176	237	25	215	68	44

The members of the teaching staff in Medicine for the past session were as follows :—

Faculty of Medicine.

Professores Emeriti.
James Thorburn, M.D.
M. H. Aikins, B.A., M.D.
W. W. Ogden, M.D.
J. H. Richardson, M D.

Professor of Surgery and Clinical Surgery—
I. H. Cameron, M.B., Tor.

Associate-Professor of Surgery and Clinical Surgery—
G. A. Peters, M.B., Tor., F.R.C S., Eng.

Associate Professors of Clinical Surgery—
A. Primrose, M.B., C.M., Edin.
B. Spencer, M.D., Tor.
L. M. Sweetnam, M.B., Tor.
H. A. Bruce, M.B., Tor., F.R.C.S., Eng.
W. Oldright, M.A., M.D., Tor.

Professor and Director of the Anatomical Department—
A. Primrose, M.B., C.M., Edin.

Associate Professor of Anatomy—
H. Wilberforce Aikins, B.A., M.B., Tor.

Lecturer and Senior Demonstrator of Anatomy—
F. N. G. Starr, M.B., Tor.

Assistant Demonstrators of Anatomy—
A. A. Small, M.B., Tor.
Clarence L. Starr, M.B., Tor.
K. C. McIllwraith, M.B. Tor.
W. J. McCollum, M.B., Tor.
R. E. Hooper, B.A., M.B., Tor.
S. H. Westman, M.B,, Tor.

Associate Professors of Medicine and Clinical Medicine—
A. McPhedran, M.B., Tor.
W. P. Caven, M.B., Tor.

Lecturers on Diseases in Children and Clinical Medicine—
H. T. Machell, M.D., Tor.
W. B. Thistle, M.B., Tor.

Lecturers in Clinical Medicine—
R. J. Dwyer, M.B.. Tor.
G. Boyd, B.A., M.B., Tor.

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FACULTY OF MEDIDINE.—*Con.*

Demonstrators of Clinical Medicine—
A. R. Gordon, M.D., Tor.
R. D. Rudolf, M.B., C.M.. Edin.
Professor of Pathology and Bacteriology—
John Caven, B.A., M.D., Tor.
Lecturer on Bacteriology—
J. J. Mackenzie, B.A., Tor.
Demonstrator on Pathology—
John Amyot, M.B, Tor.
Assistant Demonstrator on Pathology—
John Stenhouse, M.A., B.Sc., Edin., M.B., Tor.
Laboratory Assistant in Bacteriology—
W. Goldie, M.B., Tor.
Professor of Materia Medica and Therapeutics—
James M. MacCallum, B.A., M,D., Tor.
Associate Professor of Pharmacology and Therapeutics—
C. F. Heebner, Phm B., Tor.
Professor of Gynaecology—
U. Odgen, M.D., Tor.
Professor of Obstetrics—
A. H. Wright, B.A., M.D., Tor.
Demonstrator of Obstetrics—
K. C. McIlwraith, M.B., Tor.
Associate Professor of Gynaocology—
J. F. W. Ross, M.B., Tor.
Professor of Opthalmology and Otology—
R. A. Reeve, B.A., M.D., Tor.
Associate Professor of Ophthalmology and Otology—
G. H. Burnham, M.D., Tor., F.R.S.C., Edin.
Associate Professor of Laryngology and Rhinology—
G. R. McDonagh, M.D., Tor.
Professor of Hygiene—
W. Oldright, M.A., M.D., Tor.
Associate Professor of Toxicology—
W. H. Ellis, M.A., M.D, Tor.
Associate Professor of Medical Jurisprudence—
Bertram Spencer, M.D. Tor.
Lecturer on Medical Jurisprudence—
Hon. David Mills, LL.B., K.C.
Extra Mural Professor of Mental Diseases—
Daniel Clark. M.D., Tor.
Professor of Physics—
James Loudon, M.A., LL.D.
Lecturer on Physics—
C. A. Chant, B A.
Professor of Chemistry—
W. H. Pike, M.A., Oxon, Ph.D., Göttingen.
Lecturers on Chemistry—
W. L. Miller, B.A., Ph.D., Munich.
F. J. Smale, B.A., Ph.D., Leipzig.
Lecture Assistant in Chemistry—
F. B. Kenrick, B A., Ph.D., Leipzig.
Professor of Biology—
R. Ramsay Wright, M.A., B.Sc. Edin.
Assistant Demonstrator in Biology—
R. R. Bensley, B.A., M.B., Tor.
Professor of Physiology—
A. B. Macallum, B.A., M.B., Tor., Ph.D., Johns Hopkins.

The following table exhibits the number of the students registered as in attendance upon the lectures given by the staff of the Faculty of Medicine:

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Students of the fourth year	104
Students of the third year	62
Students of the second year	53
Students of the first year	58
Occasional students	36
Total	313

J. LOUDON,
PRESIDENT.

Toronto, February 1st, 1901.

APPENDIX P.

MANUAL TRAINING AND HIGH SCHOOL COURSES OF STUDY.

Report of John Seath, B.A., High School Inspector, on the Manual Training Schools of the United States, with suggestions as to changes in the courses of study in the High Schools of Ontario.

The Hon. the Minister of Education for Ontario :

Sir ;—In accordance with your letter of instructions of Aug. 30th last, directing me

(1) To visit the Manual Training Schools of the United States and to embody my views on the subject in a report ; and

(2) To consider and report upon the present High School courses of study with suggestions regarding any desirable improvements to be made when next the regulations are amended ; I beg leave to submit that, having in view the two subjects on which I had to report, I not only made myself acquainted with the character of the work in what I had reason to believe were the chief and typical Manual Training centres in the United States, but I discussed this and other phases of education with some of the leading educationalists in that country. And, further, especially during the past half year, I have taken pains to find out from Ontario educationalists and other classes of citizens what changes they think desirable in our present courses of study. The following report contains the result of the special investigation I have just completed and of my own experience as inspector and teacher. I have the honor to be, sir,

Your obedient servant,
JOHN SEATH.

TORONTO, Feb. 9th, 1901.

PART I.—MANUAL TRAINING.

The three expressions Manual Training, Industrial Education, and Technical Education are at present often used synonymously. Although similar in meaning, they are, however, not identical, and it is well at the outset to define our terms. Manual training, according to educationalists, properly means any training in hand-work designed to improve the powers of the mind. In a restricted sense, it means the training given in primary and secondary schools in working in wood and metal. In both the wider and the restricted sense, its aim is an educational one. Under this head we find included very generally the training in domestic art (sewing and cooking) and occasionally, but very properly, that in drawing. Some manual training is, of course, involved in sewing and cooking, but these subjects owe their importance and desirability chiefly to their utilitarian value. In its widest sense the term technical education is applicable to the training given for any special calling in life whether it be a trade or a profession. In its more usual and limited sense, it is synonymous with industrial education ; that is, the special education given those who are engaged in the industries or commercial production in general. The object of technical education differs from that of manual training in being an economic one. But technical education, since it involves manual training has also an educational value ; and manual training an economic one, especially in the later years of the secondary schools. Indeed, most of the manual training systems I saw in the United States had confessedly a double purpose, partly educational and partly economic, and the

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advocates of this kind of training as part of a well organized scheme of public education urged its claims often from one of these points of view but still oftener from both. This simply means, of course, that the training of the mind through the hand and the eye is valuable for every boy and girl and especially valuable for those who are to engage in industrial pursuits.

Technical Education.

It is now generally held that a complete system of Technical Education consists of three parts:—

(1) The Manual Training courses of the elementary schools, not with the object of producing artisans of any kind but for education alone. These should be the foundation of all technical education.

(2) Special training in the technique of the different trades. For this the Trade School is the provision.

(3) Higher training in the fundamental principles of the sciences for fitting men in the broadest sense to become leaders in the application of science to art. This higher training is provided in the different schools of applied science—Polytechnic Institutes, Institutes of Technology, the Applied Science departments of the universities, etc.

In the Trade School practice is emphasized; the amount of theory is small. In the School of Applied Science, on the other hand, the prime object is the teaching of theory. Practice appears here, too; but only so far as it is needed in the illustration of theory or in research.

The most typical example we have of a system of technical education is the German one. As I will point out further on, it is different from those of the United States; and, though much beyond our capabilities, will be found to be very suggestive.

For the material of the following outline I am indebted to President Loudon's convocation address of 1899 and to Prof. Kirschman of Toronto University.

TECHNICAL EDUCATION IN GERMANY.

I. Elementary Manual Training.

So far as concerns manual training in wood with bench tools, the condition of Germany is not so advanced as that of many of the other Europe an countries There the trade-school idea, which led the way, has proved to be an obstacle to the purely educational movement. Now, however, the latter is gaining ground, and has gone so far that, according to the report of Mr. Sadler, the English commissioner, its claims for state aid have been recognized by the governments of Russia, Saxony, and Baden.

(*a*) In the *Volks-schule* (our public school), throughout the whole course (from the seventh to the fifteenth year), manual training is by state law compulsory for girls. It consists of instruction in sewing, knitting, mending, darning, embroidery, and making shirts, clothes, etc. (housekeeping and, occasionally, cooking are taken up in some city schools). The teacher, a woman, is not necessarily a public school teacher. She must, however, have passed a professional examination. Manual training is not compulsory for boys. As I have already said, in comparatively few states of the German confederation has it as yet been adopted, even as an optional subject Where introduced it has been elementary, consisting usually of wood carving, basket weaving, work in paper or cardboard, sometimes wire work, and rarely other metal work. It has no reference to special trades. The teacher may be an artisan. Drawing, however, is taught boys and girls in all the public schools.

(*b*) In the *Fortbildungs-schulen*,—supplementary schools for apprentices (our night schools), the general and the technical systems overlap. They vary according to locality and prevailing conditions, and are to be found in every town and city, but not always in the smaller villages. Attendance is compulsory for all apprentices up to 18 years of age, not, however, by state law (as in public schools), but by the municipalities or by the associated trade guilds of the cities, etc.

These supplementary schools aim at a continuation of the instruction given in the public schools, with elementary technical education. Their programme includes:

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drawing, with modelling, its different branches being adapted to the needs of the trade (in Hamburg, for example, in 1898, no fewer than 40 trades were represented); book-keeping and commercial science (in its elements); arithmetic and mensuration; elementary economics, physics, chemistry, physiology and hygiene; German language and composition. Sometimes, also, in rare cases, we find manual training, similar to that given in public schools, but more adapted to the trades. This is especially the case in cities and districts with particular industries, and the manual training is then in close relation with the instruction in drawing and modelling. In cities like Nürnberg this instruction blends more or less with the higher technical school (Kunstgewerbe-schule). The teachers of the Fortbildungs school are mostly the public school teachers of the place, or some of them. But the technical teacher, that is, the drawing and modelling teacher, is in all the larger towns and cities an academically trained artist (painter, sculptor, architect, engraver, etc.) from the Polytechnicum, or Academy of Fine Arts. The lessons are given mostly in the evening, on Sunday before church time, or in the morning from 6 to 8. Usually there are no examinations, but there are annual exhibitions of the work of the pupils, open for about a week to the public. Prizes are sometimes given for the best work. In some places there are Fortbildungs-schools for girls also.

(c) In all the high schools for girls, as in the public schools, manual work is compulsory, but it is of a more elaborate and refined character. In all the high schools for boys—gymnasium, real-gymnasium, realschule, Höhere Bürger-schule, etc., instruction in freehand (with modelling) and technical drawing (projection, shading, etc.) is compulsory. But only in rare cases is there any manual training.

II. The Intermediate Technical Schools.

Next we have a numerous class of schools which prepare for certain (half-professional) positions, or for the higher trades. They are technical schools of a grade intermediate between the Fortbildungs school and the highest technical schools.

(a) Normal Schools. These include in their curriculum, in some instances, Manual Training, with sometimes special workshops for that purpose.

(b) Agricultural schools.

(c) Baugewerk-Schulen: Schools for the building trades, attended by bricklayers stonemasons and carpenters.

(d) Technica: Schools for engineers, electricians, etc.

(e) Horticultural Schools.

(f) Kunstgewerbe-Schulen: Schools for higher artisans, as: jewellers, wood-carvers, engravers, lithographers, stone cutters, etc., with special reference to the artistic side of their trades.

(g) Military Schools: For the preparation of non-commissioned and commissioned officers.

(h) Navigation Schools.

(i) Technical Schools for special single trades, as the tanner schools, the watchmaker schools, weaver schools, glass industry schools, etc. There also are industrial schools for women in Saxony.

(j) Commercial Schools: French and English form part of the curriculum of these schools, and the pupils consist almost wholly of those engaged in business. At Hamburg, for example, of 174 in attendance in 1898, only four were not engaged in business.

III. The Highest Technical Schools.

The technical institutions of the highest grade are:—

(a) Universities: The universities in their science departments are intimately connected with the industries. These have sometimes agricultural departments also.

(b) Polytechnica, or "Technical High Schools." These rank with the universities and train men as engineers, architects, chemists, etc.

(c) The Berg Academy (Mining) at Freiberg (Saxony): This and the preceding class correspond to our School of Practical Science.

(d) Forestry Academies: For instance, at Newstadt, Eberswald, Aschaffenburg.

(f) Agricultural Academies: For instance, at Papellsdorff near Berlin.

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(*g*) Military Academies: Here commissioned officers, lieutenants and captains receive a higher training after having served for some years as officers. So far as I can find out, no officer can become a major without having attended. There is also, I believe, a similar naval academy.

(*h*) Kunst Academies: Academies for fine art, for instance at Munich, Stuttgart, Berlin, Düsseldorf, Darmstadt, Dresden, etc.

Only those who attend these highest academic institutions are entitled to call themselves students or academic citizens. All students of universities, polytechnica and the other academies have equal rank with the commissioned officers of the army and are under the same obligations of honor with regard to duels.

(*i*) Commercial Academies: For instance the Brewer Academy in Munich; but these do not seem to have the same rank as other academic institutions.

Technical education in Germany is maintained by the municipalities chiefly, or by private enterprise, both being occasionally assisted by the State and being always under State control. In the last number of the *German Watchmakers' Gazette*, for example, it is announced that a sum equal to $2,000 has been granted to a watchmakers' school in Saxony.

No agriculture is taught in German primary and secondary schools. But in country public schools the art of planting and grafting trees and a few other simple operations are occasionally taken up, and in the lessons in chemistry in the high schools (Real-schule, Real-gymnasium, etc.) due attention is given to agricultural applications.

To sum up, in the words of President Loudon: "The technical system of Germany covers the whole field of industry and commerce. It distinguishes clearly between the general and the technical. No attempt is made to put a veneer of technical training on a defective general training. It distinguishes between the training of the director, the foreman, and the operative. In all grades it concentrates effort on the underlying principles of art and science and their application. The general result is a thoroughly trained body of workmen under scientific leadership."

Manual Training.

The first stage in a good system of manual training, such as I saw in the best organized schools of the United States, is the kindergarten with its "gifts" and "occupations." Froebel, to whose doctrines we owe both the kindergarten and manual training, held that the human mind is developed fully and naturally only when the creative activities are brought under systematic and continuous training equally with the acquisitive powers. A scheme of education which concerns itself with the latter only is incomplete; it should provide exercises in the translation of thought into action, and of ideas into material representation. Manual training is, therefore, the logical and natural sequence of the kindergarten. The exercises connecting the kindergarten and manual training proper, that is, work with tools and machines on wood and iron, are of various kinds; but, from appearances, this phase of the subject, I should judge, has not yet been fully worked out. Paper and card-board work, bent iron work, and knife work, seem to be the commonest and the most suitable. Paper and card-board are cheap and easily manipulated, while bent iron lends itself to the cultivation of good taste in design and to freedom in individual expression. Knife-work (whittling, carving, etc) is also cheap and simple, and, when followed out intelligently has been proved to produce excellent results. The course in wood-working with bench tools begins when the pupil is about eleven years of age, or as soon as he can handle them, and continues throughout the higher grades of the elementary schools until he is about fifteen. In the systems which one usually encounters, the work in wood consists of a series of exercises intended to relate it to the interests of the pupils. The models are simple, useful articles that have a place in his life, whether at play, at school, or at home. One sometimes finds, however, schemes in which this relation is not considered so much as the development of the principles that underlie the use of the tools. In the former systems, in particular, while the models stimulate to healthy, spontaneous self-activity, they are so devised as to cultivate also a sense of artistic form. The course with bench tools is sometimes finished in the primary school but is more usually continued in the High School, where it is followed by machine work—wood turning; the same objects being kept in view here also.

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This work, in particular, developes delicacy of manipulation. In pattern making, the next stage, the pupil obtains a knowledge of the technique of the subject, and his manual training is continued on the same lines as in the previous exercises. Pattern making is followed by moulding, its natural sequence. Next come blacksmithing and forging. At this stage the pupil receives a special training in quickness and decision, and, as the models are of a decorative character, his aesthetic sense is also cultivated. The last course consists of filing and chipping iron with practice in the various tools of a fully equipped machine shop. Occasionally girls take the course in wood-work in the Grammar grades and (though rarely) in the first year of the High School; but usually in these grades parallel courses are provided for them in drawing and domestic science and art. The preceding is, of course, a mere outline. Further on I submit typical school courses which give definite details of what is attempted in both the primary and the secondary schools.

THE SWEDISH AND THE RUSSIAN SYSTEMS.

As I have already said, no general system has yet been evolved between the kindergarten and the wood-work of the higher elementary grades. The same remark applies, in a measure, to the exercises in wood-work, owing, I think, not so much to the difficulty of the problem as to the fact that they came to this continent from two sources—Russia and Sweden. The main differences between these two systems in their original forms were that the Russian emphasized the value of the working drawing; the Swedish system, or, as it is called, Sloyd, neglected it; and that Sloyd required each piece of work to be a complete and useful article, whereas, the Russian attached no importance to this feature, being, in the earlier part of the course, only so many specimens of joinery. But both of these systems have been modified. Sloyd now emphasizes the working drawing while the Russian exercises have been simplified; and both have been adapted to American conditions. As defined by its advocates, Sloyd is tool work so arranged and employed as to stimulate and promote vigorous, intelligent self-activity, for a purpose which the learner recognizes as good. Its aim—and this should be the aim of any manual training system—is the harmonious development of the pupil during the formative age, giving him by manual exercises and the use of the creative instincts such general training as will fit him mentally, morally and physically for any subsequent special training. The Russian system assumes that the forms of tools are the product of evolution, being the result of the best thought and the highest skill. Each tool has its functions and its correct methods of use. Again, each material has its characteristics, its limitations, its weak and its strong sides. These must all be brought out, contrasted and compared. And again construction consists chiefly in methods of combining pieces; hence joints, unions, and fittings constitute the chief elements. To a subordinate extent individual parts are to be shaped or modelled in accordance with the laws of simplicity, strength and beauty. Finally, the muscular strength of the boy's hand and arm, and his ability to be accurate, to be logical, and to be provident, must be duly considered.

Sloyd, however, has some advantages, especially for elementary classes. It makes less of the tool and more of the child. Its gymnastics are better and its exercises have a more human interest. The completed article appeals more strongly to the sympathy of the young than the more formal exercises of the Russian system. The latter are more suitable for High School pupils, especially if the course leads to an economic goal.

As a matter of fact, however, the character of the models I found in many places varied so much as the result of the teacher's individuality, that, although I often heard the terms "American Sloyd" and "American Russian" many of the systems are eclectic, consisting of what the teacher regarded as the best feature of each. This is, of course, as it should be.

THE ARGUMENT FOR MANUAL TRAINING.

Here it will be well to summarize the arguments for manual training as a necessary element in all education :

(1) Theoretically Manual Training is necessary. As Froebel has shown, education consists in developing all our faculties fully and naturally. To use the language of the Froebellian : "We must put the whole boy to school." It develops a large area of motor brain-energy which the old departments left untouched.

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Our populations are fast becoming urbanized. The boy and girl on the farm or in the village still gets this training in a haphazard fashion, but the time has gone by even in Ontario when such home-training was general; for the bulk of our school population it is no longer available. Besides, every child enjoys creative work. Drawing, itself a limited kind of manual training, is the only other subject we have which recognizes the craving.

(2) Experience is in favor of Manual Training. Those who have to do with it all testify to its value:

(*a*) As an intellectual stimulus. Psychology tells us that, when we develop the motor activities, we stimulate the sensory and other brain areas. It comes, too, as a rest and agreeable change from the purely intellectual and is thus a help rather than a hindrance to the regular class work. Manual training helps any boy—the dull boy, in particular—in his other studies.

(*b*) As a social influence. It is itself labor; and its presence in a programme dignifies labor. The professional man is better for it, and it counteracts the present tendencies to despise manual labor—agriculture as well as the trades—and to crowd the professions. Schools in which book studies are the only or the chief ones make the pupils discontented with occupations in which bodily labor plays an important part, and incite them to leave their rural home for the city and the genteel occupations.

(*c*) As a moral agent. It cultivates habits of independence, orginality, self-control, accuracy, observation, truthfulness, taste, and neatness. Children engaged in trying to give material expression to some form of usefulness and beauty, grow themselves into unconscious goodness. It seems also to hold many in school who would otherwise lose interest and drop out for all sorts of frivolous reasons.

(*d*) As a preparation for manual occupations. While it does not aim to prepare for the trades, it is the best practical preparation that can be given. Even the ability to read and apply the working drawing is itself of very great value. For the various minor duties of life, requiring manual skill, it is equally valuable. What more useful household accomplishment can there be than "handiness?"

(*e*) As a physical gymnastic. Exercises like sawing and planing develop the larger muscles, while the smaller ones are developed by the more delicate work of drawing, designing, and finishing. Sloyd, in particular, attaches much importance to a correct position at work.

Manual Training in the United States.

The history of the evolution of manual training is interesting and valuable, for it throws light on the present situation. A few epoch-marking events it is well to note here. When trade schools were established in Belgium, France, and Germany, it was found that, to secure satisfactory results, mathematics and science, and drawing in particular, must form part of the course of instruction. At first, the object was wholly economic; but it soon became evident to educationalists that training in the use of tools based on fundamental principles was of educational value. In 1858 a simple system of manual training was devised in Finland which recommended itself so highly that, eight years later, it was by law made obligatory in all the primary and normal schools of that country. It is well to note that the author of this system credits Froebel with the educational theory that underlies it. Sweden, which also claims to have had some form of manual training for over forty years, has given us the Sloyd system, already described. Of late years manual training for the young, often associated with technical education, has spread all over Europe, so that it is now found also, in some form or other, in the schools of Belgium, Germany, Austria, Switzerland, France, and England. In London, England, for example, it was introduced about 1886. The law, however, did not then permit the use of public funds for this purpose, and, in 1887, one of the Commercial Guilds gave a grant of $5,000. So successful and so popular did the new training prove that, in 1890, it was placed by the Education Department on the school programme; power was given the school board to apply municipal funds; and grants were made for its maintenance by the Imperial Parliament. Last year, in the City of London alone there were over 150 centres at which the boys of the primary schools received instruction in wood, leather and metal work. The late National Commission for Ireland, after a thorough investigation of the subject, has also, I may add,

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reported very strongly in favor of the introduction of manual training into the national schools of that country.

The first suggestion in the United States came from a report of the director of the Imperial Technical School at St. Peterburg. This, the Russian system, was originally designed for students who entered the Technical School at 18 years of age. It is, however, held that the credit of adapting it to boys of fourteen or even younger belongs to the United States. The Russian educational exhibit at the Centennial Exhibition (1876) presented a full description of the system with a set of models to show how the tools were to be used. Pres. Rundle, of the Massachusetts Institute of Technology, was so impressed with the educational value of this exhibit, that, on his return from Philadelphia, he published a full report of it and established classes in tool instruction in his own college. As early as 1872 a shop for tool instruction and practice was equipped in Washington University, St. Louis, by C. M. Woodward, now director of the Manual Training School of the University and, I believe, admittedly the protagonist of Manual Training on the American continent. In 1882 the subject was presented at the meetings of the American National Educational Association, and a committee thereof reported in its favor. In 1888, through the liberality of Mrs. Shaw, of Boston, Sloyd was introduced into the schools of that city, where the Russian system was also on trial. At first it was not very successful, but, as adapted by Mr. Gustav Larrson, now Principal of the Sloyd Training School, it has achieved remarkable success and is now the vogue in the grammar schools of Boston and many other cities, and its motive, indeed, has penetrated farther and deeper than the name itself. It has proved to be the leaven of the system. As originally introduced both the motive and consequently the method of manual training were different from those of the present systems. The motive was technical. The earlier exercises were undertaken to give a skill of hand to be used in industry. The later ones give a skill of organism to be used in life. They are designed to train the mind through the hand. On this subject, for the last ten years, there has been no difference of opinion amongst modern educationalists. Any differences there are regard only its organization.

THE PRESENT SITUATION.

Advance sheets of the U.S. Bureau of Education (for which I am indebted to the courtesy of Dr. W. T. Harris, the U.S. Commissioner of Education) show that in 1899 manual training had been introduced into at least some of the leading cities of nearly all the States of the Union, and that the number of centres is rapidly increasing. Thus, for example, in 1890 there were 37 centres in cities of 8,000 and over; in 1894, 93; in 1896, 121; and in 1898 (the last year for which there is a record), 146. In this, as, indeed, in any other subject that makes for education the State of Massachusetts took from the first the leading place. In 1887 the first text book for beginners was published in Boston, and in 1894, chiefly, I believe, through the efforts of the Hon. Frank Hill, now secretary of the State Board of Education, and by general consent one of our foremost educationalists, a law was passed requiring every city and town of 20,000 and over to maintain manual training as part of its High School system, and in 1898 a clause was added requiring such communities to provide for this training in the primary schools also. While the State makes no distinction between boys and girls, the early provision was for boys only. Of late the claims of girls have been recognized as well in the provision that now exists for instruction in the arts that pertain to the household and the sciences that underlie them. The last report of the Massachuetts State Board (1898-1899) shows that not only have almost all the cities affected complied, often most generously, with the manual training law, but that no fewer than eighteen other cities and towns with populations of from 1000 to 1900 which are not affected by it, have voluntarily made provision.

I have so far dealt chiefly with one side of the new movement. The associated departments of sewing and cooking have not met with the obstacles that have stood in the way of manual training. Their introduction and maintenance cost less, and their utilitarian value commends itself more directly to the people. These subjects are very common in the grammar schools. Cooking I found oftener in the high schools than sewing.

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All this has not been accomplished without much effort and a large expenditure of public money, especially in the high schools. Local sentiment, however, still varies from strong advocacy to antagonism, and, although in Massachusetts the general feeling has expressed itself in legislation as being favorable, the work of educating the people has still to go on even in this enlightened commonwealth. It is well to note here that, while the labor unions still look askance upon trade schools, they are invariably favorable to manual training. As an illustration I may record the fact that the last annual report of the Illinois bureau of labor statistics recommends the passage of a law favoring the compulsory establishment of Kindergartens in towns of 5,000 inhabitants or over. In cities of over 20,000 people it recommends manual training schools, and also suggests that provision be made for the training of Kindergarten and Manual Training teachers in all the State Normal Schools. A bill based on these recommendations and including domestic art has just been introduced into the legislatures. Still further, under date of January 24th, I find that the Building Trades Council and the Bricklayers' Labor Union of Chicago have petitioned the Board of Education to have their apprentices take technical training at the English High and Manual Training School of that city. This also is suggestive to Ontario.

HIGHER TECHNICAL INSTITUTIONS.

Of the higher institutions for technical education in the United States, although I heard of a large number, being directly interested chiefly in primary and secondary education, I visited only the Armour Institute (Chicago), the Drexel Institute (Philadelphia), the Massachusetts Institute of Technology (Boston), the Pratt Institute (Brooklyn), and some of the departments of Applied Science of the universities in manual training centres. My object in visiting even these was as much to ascertain what estimate their authorities put upon manual training, as to see the highest phases of technical education in the United States. One very remarkable peculiarity about almost all the higher technical institutions that I visited or heard of, is the fact that they are either endowed by private benefactors and maintained in the same way or partly by fees, or they are wholly self-supporting. So far as my experience goes, the Massachusetts Institute of Technology is the only one which has received legislative aid. Of course, there are States, as, for example, Michigan, which support universities, and even in New York and the New England States, grants are made from the public funds for special educational purposes, as, for example, the grant to the Agricultural Department of Cornell; but I am now giving my own experience. The provision for higher technical education in the States includes also military schools, agricultural colleges, and university agricultural departments. As in the case of the other technical schools, some of these are supported wholly or partly by the State, and others by private benefactions. The only one I visited was the agricultural department of Cornell University. This I will discuss further on in connection with the question of agricultural teaching in our public and high schools.

The Massachusetts Institute of Technology is undoubtedly the largest and most complete school of the kind in the United States, and it is also one of the largest in the world. Some idea of its relative size and importance may be gathered from the fact that it has a staff of 175 professors and instructors, and that its current expenditure for maintenance alone in 1899 was $367,500; whereas there are only 14 on the staff of our School of Practical Science and its annual expenditure is only $35,000. I should add, however, that, on the average, it costs but $175 to educate one of our students, whereas it costs in the Boston Institute $314. The curriculum embraces almost every science which finds application in the arts. A characteristic and very important feature of all the courses and one wanting in most other similar institutions, is that a by no means inconsiderable amount of general literary culture is required in addition from every candidate for its degree. Recognizing the fact that few students of technical schools are university or college graduates, and that the aim of the institute should be first of all to send out broadly trained men, the faculty has always insisted that liberal studies should be incorporated in every department of the curriculum. With Prof Schwamb, to whom with President Pritchell I am indebted for much valuable information, I visited the "shops," or mechanical laboratories, which are considered an important adjunct of the other laboratories. These consist of a fully equipped shop for carpentery, wood turning and pattern making, foundry for iron and brass, a forge-shop and power-hammer, and a

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machine shop with about 40 lathes—an establishment corresponding, in fact, to the mechanical laboratories of the best manual training high schools.

The Armour, Drexel, and Pratt Institutes of Technology, named after the gentlemen to whose munificence they owe their foundation and chief support, have departments corresponding to some of those of the Boston Institute, but they have preparatory and other schools affiliated and are wider and more popular in the range and character of their courses. The words of the year book of the Drexel Institute are applicable to all. The chief object of these institutions is "the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women," and "providing means of culture for the public by evening classes, free lectures and concerts, the library and the museum." The buildings and the equipment of the Drexel and Pratt Institutes are very fine—especially those of the former, which, being of more recent establishment, represent the best features of similar older institutions. The Armour Institute is not so well equipped as either of the others, nor are its courses so comprehensive; and, notwithstanding the long continued generosity of the late founder, it is now much cramped for room. The Drexel and Pratt Institutes present more ambitious programmes, and the range is extraordinarily large, embracing almost every existing phase of education—Fine and Applied Art, Mechanic Arts, Electrical Engineering, Technical courses, Science courses, Commerce and Finance, Domestic Science and Art, Library Schools (to prepare librarians), Language and Literature, Physical Culture, free lectures and entertainments, organ recitals and concerts, choral classes, with very fine libraries and museums. The Armour and Pratt Institutes have also preparatory high schools attached, and the latter has a trade school with evening classes in carpentery, machine work, plumbing, house-painting, sign-painting and fresco-painting. These institutions are attended by thousands of students of all classes, and seem to me to be the natural product of a prosperous, liberal, and progressive people.

The authorities of these three institutes all speak in the highest terms of the value of Manual Training. Dr. MacAllister (of the Drexel Institute), in particular, was one of its first and most strenuous advocates, even maintaining that it should be continued to the end of the high school course as part of a liberal education. His contention, in which the other educationalists I met concur, is that there cannot be full development of the motor centres of the brain without a systematic training in metal work.

As will be seen later, the manual training high schools offer, in addition to general and other courses, what they call a preparatory course for the higher technical schools. Such courses may be projected before long in Ontario, and I thought it wise to ascertain the experience of those who had had an opportunity of testing the results. All of these higher schools, I should explain, have "shops" for wood and metal work, duplicating, in fact, the course of the manual training high schools. The only exception I know of in the United States is the department of Applied Science in Yale University. President Hadley has been good enough to explain to me that Yale has found it necessary to avoid the use of shopwork in the department of mechanical engineering; not because the university undervalues manual training, but because, in the stage of specialized education preliminary to actual professional life, the young men liked shopwork so much that they tended to overrate its value in proportion to other things. He has received testimonials from the best engineers all over the country that the effect of this practice on the part of Yale had been good; that the young men who came to them trained in college shops not only had a great deal to unlearn, but had false conceptions which stood in their way. Here it may be well to note that the position of the president of Yale in this matter is that taken by Principal Galbraith of our School of Practical Science, although his reasons for not desiring the "shops" are, as he stated in his address last December, not the same as those given by President Hadley.

Opinions of University and other Authorities.

On the question of the relation of the manual training schools in the United States to the higher technical institutions, I am able to submit the following opinions :

From the Sec. of the Mass. Inst. of Technology, Boston.

"I am inclined to answer your question as to preparation in manual training schools as follows : In the first place, a manual training school attracts and holds a considerable portion of boys who would have abandoned the ordinary academic high school course to go into practical work without ever completing

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preparation for admission to the institute. The Mechanic Arts High School in Boston thus sends us at present more applicants than any other school, while the number coming from the English High School has fallen off very considerably. These boys include a large proportion from the industrial and even the poorer classes, increasing incidentally the demand for scholarship aid. In the second place, the value of their preparation for our work depends much on the quality of the boy, and much, of course, on the quality of the teaching, apart from the abstract merits of the kind of education itself. The boys who come to us from the manual training schools are to some extent those whose particular mechanical instincts were at the outset relatively strong. These boys, when they come to us, are therefore likely to be one-sided, and to show weakness, or even to fail in our literary requirements, which are considerable during the first three years. In the third place, the direct anticipation of our drawing and shopwork in the manual training school is an advantage of varying importance. The work can rarely be so well done as by our own students, in the shorter time which the latter give to it. The drawing is required in all our courses, but shopwork is required only in particular ones in varying amounts.

"On the whole, I am disposed to advise that a boy should choose between the manual training and other secondary schools on other grounds than their supposed merits as preparatory schools, and to consider them in this respect as of about equal strength, assuming, of course, that the academic preparatory course will include some study of natural and physical science, without which any secondary course seems to me to be defective.

"It is doubtless an advantage from our point of view that our students should have had training in drawing and shopwork at an early age. It does not follow that in a particular case this training may have been the best.

"Professor Schwamb suggests that I add that the shopwork of our students can be done in less time and more thoroughly, partly because the men are more mature, but mainly because of their training in exact work in other laboratories of the institute. He adds that previous training in shopwork and drawing is of particular advantage to students in certain other engineering courses, for example, civil engineering, which do not include it in their actual requirements."

From President Hadley, of Yale:

"We have not as yet been able so to arrange our examinations that manual training can be made a part of them; and as we admit only on examination, and not on certificate, this has prevented us from incorporating it in the requirements for admission.

"I may, however, add that the work done by those who have had courses in good manual training schools has been of such high character that we are most favorably impressed with its value in secondary education."

From the Sec. of the Faculty of Mechanical Engineering, Cornell:

"We do not directly recognize manual training in our matriculation. After the students have entered upon the work of the course, if they are able to show the necessary skill, we allow them to make a certain number of exercises standing as an examination, and these, if up to the standard, may be accepted in place of the term's work. In this manner, if the student has gained sufficient training at the high school, he may be able to make it count in the university. Our experience has been, however, so far, that comparatively few students with only high school manual training are able to pass up very much of the work. Neither do we find that at the end of the four years' course the man who has had high school manual training is likely to be in advance of his fellow who has not had such training. In other words, we find that the condition of the student at the end of his course will depend more upon the manner in which he has utilized the advantages which we provide than upon whether or not he has had previous training in the high school. I think that I may fairly say that for purposes of university preparation we do not place any great value upon high school manual training. We are quite content that the student should come without such training, and believe that for our purposes the time might be better spent in thorough training in the elementary subjects required for entrance. It does not follow that high school manual training has no value. It is a fact, of course, that but a small percentage of high school students finally reach the university and take a full university course. For the great majority who go from the high school into the world it may well be that they would find a course of manual training of great value; but I am convinced that if manual training in the high school has to be justified it must be by reason of its value for this class of students rather than for the one who goes on to take a university technical course.'

Harvard University recognizes the Manual Training System in its requirements for admission to its department of Applied Science. This concession is, no doubt, due to Pres. Eliot's appreciation of the subject, an appreciation which he has publicly proclaimed. He is absent from the country at present, and I was unable to obtain his views. To some of the Harvard authorities, the chief value of manual training, I understand, seems to be in the education of young men who need to have their interest stimulated by manual exercises. Such training is also held to have an important place in providing the large number of young men who are employed in the smaller trades to be found about every large city. It is also believed that the system has not been long enough in operation at Harvard to justify any general conclusion in regard to its desirability as a preparation for college work.

Evidently the relation of the Manual Training School to the higher Technical Institutes has not yet been worked out in the United States, and the situation there would not justify us in making any immediate provision for preparatory courses in Manual Training for our University faculties of Applied Science.

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MANUAL TRAINING HIGH SCHOOLS.

It would be impossible to give any definite general statement of the organization of the Manual Training High Schools. Although having the same general character, they differ according to the individualism of the cities and towns in which they are situated. The most important I saw are those of Boston (Mass). Brooklyn (N. Y), Cambridge (Mass.), Chicago (Ill.), New Haven (Conn.), Philadelphia (Penn.), Providence (R. I.), and Springfield (Mass.). All of them have separate buildings and are well equipped and well manned. Co-ordinate with them in their localities are English and Latin High Schools, also in separate buildings; the number of such High Schools in a city varying from one in Springfield to about a dozen each in Boston and Chicago. I may say in passing that an idea of the attitude of the American people towards a secondary education may be got from the fact that, in Philadelphia, the Boys' High School alone cost $1,300,000, and in Springfield, a city with a population of only 60,000, its new High School—a most magnificent edifice—cost about $750,000. The cost of the buildings and the equipment of the Manual Training High Schools I visited runs from about $25-000 to nearly $300,000 (the Boston Mechanics Arts High School). All of the High Schools—English, Latin, and Manual Training—are free to residents, as, indeed, are all the Public Schools of the United States that I saw or heard of. The Manual Training Schools enumerated above are now all owned and managed by the local Boards of Education. The Rindge Manual Training School of Cambridge was founded in 1888 and maintained until 1899 by Mr. F.H. Ringe, a wealthy merchant of that city. In the latter year it was unconditionally handed over to the Board of Education and is now a part of the public school system of Cambridge; the fine new English and Latin High Schools having been built on adjacent squares. The Boardman Manual Training High School of New Haven is a gift of the widow of the Hon. W. W. Boardman, who donated $70,000 for a building, the City Board of Education furnishing the land and the equipment and defraying the current expenses. All the others I visited had been established by the municipalities in which they are situated; all, without any exception, are in a flourishing condition; and most are in pressing need of more accommodations.

All of the above mentioned Manual Training Schools are real High Schools, with the same entrance requirements as the English and Latin High Schools, but differing from them in substituting courses in Manual Training for some of their academic work in the languages. All have courses in English, Mathematics, and Science; a few have Latin; all have French; most German; and one Spanish. Five of them—those in Boston, Cambridge, Chicago, Philadelphia, and Springfield—are for boys only; the Domestic Art and Science for girls being in one or two of these cities provided in the English High Schools. All of them offer what are called "General Courses"; that is, courses (with Manual Training) suitable for those who want only a general education, as well as preparatory courses for the different Higher Schools of Technology. The Schools of Boston and Springfield are known as Mechanic Art Schools, because they have specialized in courses developing the principles of the Mechanics Arts, and the same name might also be applied with equal suitability to the Schools in Cambridge, Chicago and Philadelphia. The Manual Training Schools of Brooklyn, Providence, and New Haven provide courses for girls in Art and in Domestic Science and Art, while the Brooklyn and Chicago Schools provide Commercial Courses also. In Philadelphia there is a special commercial High School attended by about 1,000 girls, but usually this branch of instruction is provided for in the English High Schools. In Boston, Brooklyn (except for commercial students), Cambridge, New Haven, Providence, and Springfield, the courses are of four years; and in the others, of three, except in Philadelphia (which has two public Manual Training Schools in different parts of the city), where there is a post graduate course in the Languages, History, Mathematics, and Science.

Of High Schools which have a manual training department in addition to the usual academic ones, I may mention in particular those at Albany (N.Y.), Brookline (Mass.), and Lynn (Mass). The accommodation at Albany consists of some rooms in the basement, and the equipment is by no means elaborate. The courses are in woodwork only, and are taken as an option by both girls and boys. Here there are two teachers, a man for the boys and a woman for the girls. The teacher of the girls had taken a summer course at the training school in Nääs (Sweden), and was as enthusiastic an advocate

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of Americanized Sloyd as the teacher of the boys' work was of Americanized Russian. In the last year of the girls' course, clay modelling and carving in wood are substituted for the boys' machine work in wood. The wood-carving and joinery of the girls, I may say, was exceedingly good. The boys of the Brookline High School take under a special teacher the work in wood and iron in the building of the William T. Lincoln Grammar School. The course here is a good one and was spoken of in high terms of commendation by the superintendent of the mechanical shops in the Massachusetts Institute of Technology. In Lynn, near Boston (population 60,000), the work in both wood and iron is taken in the old High School building, adjacent to the new English and Latin Schools (which cost $280,000). The equipment is of the best, and the staff (of four) is the largest I saw in any of the manual training departments of an English High School. The course in shop-work is a three years' one:—Joinery (28 weeks), wood turning (12 weeks), for the first year; wood turning and pattern making (23 weeks) cabinet making (5 weeks), and forging (12 weeks), for the second year; and tool making, tempering, compounding of metals and alloys, moulding and casting (16 weeks), and hipping and filing and machine work (24 weeks), for the third year. Drawing, of course, is here as elsewhere, closely correlated with the shop work. Here I was especially struck with the attention given to such parts of forestry as could be taken up in connection with the course in wood. A peculiarity of the school which is suggestive to us in Ontario is that the teachers of manual training take a share in the academic work in the High School proper in English and mathematics. A course in Domestic Science is provided for the 8th Grammar School girls of Lynn in two different centres, but no such provision exists in the High Schools.

As I have already said, these schools are not regarded as trade schools either by their staffs or by the public, and I seldom heard the education they give described as technical. Both terms seem to be studiously avoided in this connection. It is always held that the schools have as much claim to be considered educational as have the English or the Latin High Schools, They specialize in manual training; the English and the Latin schools, in English and the languages. Indeed, it is maintained that the Manual Training Schools are more important educationally than are the other two classes of High Schools, for they educate the whole nature, the creative as well as the acquisitive powers. It is not, however, denied that in the later years of the work, the courses are a direct preparation for the industrial pursuits; but it is pointed out that the courses in the other schools are a direct preparation for the professions, and that the industrial arts have at least an equal right to consideration. Some of the Manual Training Schools as, for example, those in Providence and New Haven, may fairly be described as lower grade Technical Schools; they emphasize the industrial aspect more than some of the others. Such schools supply a demand which the decline of the apprentice system and the marvellous progress of industry have of late years developed in the United States for technical training of a grade below that of the Schools of Technology. They prepare young men whose funds and time are limited, for positions as designers, draughtsmen, and superior workmen, many of whom eventually become foremen and managers; and, with the education they give, a man of ability may rise to any position in industrial life: not all a man's education is obtained at school or at college. It is, I should think, exceedingly probable that the Manual Training High School idea will develop more and more in this direction especially in the smaller cities, where limited financial support will prevent a more complete sub-division of educational labor.

An examination of the records of seven hundred or more of one of these institutions shows that 70 per cent. of its former students are engaged in pursuits in which what is required is a high order of intelligence with skill of hand in dealing with force and matter. Already a large number occupy positions of trust and responsibility as superintendents, managers, and foremen. That such schools also foster a desire for higher learning is shown by the fact that 20 per cent. of the graduates become students in the colleges, universities, and higher technical schools. On another point, emphasis was laid by all the principals I saw; many of the students go into kindred commercial occupations (hardware stores, etc.), or become dentists, doctors or lawyers. These, I am told, bear witness to the great advantage from hand and eye training and a general acquaintance with industrial pursuits. The resulting sympathy with and respect for labor are also not the least of the recommendations of such courses for those whose occupations are of a more literary character.

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The flexibility of the American system—its adaptability to local needs—is seen everywhere. In Springfield, for example, I found, in connection with the Mechanic Arts High School, evening trades classes in tool-making and plumbing. These classes were at first very successful; but, owing to the withdrawal of the city appropriation, a fee had to be charged and the attendance at once fell off. At present only the class in plumbing survives. It is also significent of the liberality and intelligence of the American workmen in Springfield, which is a distinctively manufacturing city, that its Plumbers' Association have voluntarily agreed, in employing help, to give the preference to members of the evening classes in plumbing. Speaking of these classes in his report for 1899, Mr. Thos. M. Balliet, the city superintendent, uses words which show clearly the direction in which the manual training idea is drifting in some parts of the United States :

"The success of these classes makes it clear that if provision were made for the teaching of several trades in the day high school, in the Manual Training course, it would meet with wide popular approval; and it would provide a kind of high school education for boys who ordinarily are obliged to go to work when they have completed the grammar school course and are thus deprived entirely of a high school education. The present equipment and teaching force, both of which have been increased the present month to provide for the needs of the school as now organized, would also be sufficient to teach machine shop practice, pattern making, and joinery as trades. The adding of other trades would, at this time involve more or less additional expense."

MANUAL TRAINING HIGH SCHOOL COURSES.

I give below the courses of study in the Boston and Providence schools as being two characteristic types of the Manual Training High School. The Boston school (for boys only) has specialized in the Mechanics' Arts, and the Providence one (for both girls and boys) is of a more popular character, each being organized to meet the peculiar requirements of its district :

MECHANIC ARTS HIGH SCHOOL, BOSTON.

COURSE OF STUDY.

This course of study is not to be regarded as a permanent one, but simply as a trial course which is subject to change at any time. At first the course was a three years' one. Recently a fourth year has been added.

FIRST YEAR.

Academic.	Hours per week.	Months.	Mechanic Arts.	Hours per week.	Months.
Algebra	5	10	Drawing	5	10
General History (alternate days)	2½	10	Carpentering	10	7
English (alternate days)	2½	10	Wood-carving	10	3

SECOND YEAR.

Algebra (alternate days)	2½	10	Drawing (alternate days)	2½	10
Plane Geometry	5	10	Wood-turning, pattern-making	10	5
History of the United States, Civil Government (alternate days)	2½	10	Forging	10	5
English	2½	10			
French	2½	10			

THIRD YEAR.

Solid Geometry	5	5	Drawing (alternate days)	2½	10
Plane Trigonometry	5	5	Machinist's work—with hand tools mainly	10	3
Physics (alternate days)	2½	10	With machine-tools mainly	10	7
English (alternate days)	2½	10			
French	5	10			

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FOURTH YEAR.

Trigonometry: applications to phyics, surveying, and navigation	2½	10	Drawing	2½	10
Physics: laboratory work	2½	10	Machine Shop Practice and projects involving the shop work of preceding years	10	10
Chemistry	5	10			
Advanced Algebra	2½	10			
Plane Geometry	5	10			
History of the United States	2½	10			
English	2½	10			
French	5	10			
German	5	10			

The subjects specified for the fourth year, with the exception of English, are optional. Candidates for diplomas are required to take throughout the year the equivalent of 15 hours per week in the academic department, and 12½ hours in the department of mechanic arts, but the work of either department may be substituted for equivalent work in the other. A prepared recitation is counted as the equivalent of two hours of laboratory work, shop work, or drawing.

The omission or choice of a study must be subject to the approval of the principal.

MECHANIC ARTS DEPARTMENT.

For each of the mechanical departments a carefully graded series of models has been chosen, the construction of which illustrates every fundamental principle or process. The models in the primary series are made by all the members of a class. Running parallel with the primary series is a set of supplementary models that involve the application of principles already learned to more difficult work. The supplementary exercises are undertaken only by those who are capable of doing more than the regular work of the class.

The aim of the course in drawing is to teach the proper use of the pencil and drawing instruments, and to give facility in the expression of ideas of form by the various methods of freehand and mechanical representation. About two-fifths of the time assigned to drawing each year is devoted to freehand work, and the remainder to mechanical drawing. In addition to the carefully executed plates much attention is given to the rapid production of drawings of models sufficiently accurate for many useful purposes, but by no means finished work. Such sketches frequently furnish the data for complete working drawings.

DRAWING.

FIRST YEAR.

Freehand lettering. Freehand sketching: views of type solids and carpentry models. Elementary working drawings of carpentry models to scale. Elementary Geometric problems. Geometric designs. Orthographic projection of simple solids: cutting planes, sections, and developments. Designs of supplementary shop exercises: book-rack, tool-box, small tables. Freehand appearance drawings of types, singly and in groups. Freehand historic ornament.

SECOND YEAR.

Orthographic projections, intersections, and developments. Applications of line shading and tinting. Freehand and instrumental working drawings of shop exercises. Freehand elementary design. Original designs of goblets, balustrades, and vase forms, to be executed in the turning course. Original designs for wrought-iron work: grille, andirons, fire set, to be executed in the forge shop. Isometric drawing of details of building construction: framing. Application of geometric problems to the construction and decoration of openings: arches, windows. Freehand appearance drawing: casts, historic ornament, furniture, parts of room, machinery. Geometric problems: ellipse, helix, spirals. Machine details: bolts, nuts, screw threads.

THIRD YEAR.

Projection of shadows. Geometric problems; cycloid, epicycloid, hypocycloid, involute. Mechanical movements: cams, gears, eccentrics, pulleys, belting. Details of machinery: lathe, marine engine, dynamo. Elementary architectural design and decoration: plans, elevations, sections. Light and shade, orders of architecture from casts, pen and ink rendering. Tracings and blue prints.

CARPENTRY AND WOOD-CARVING.

The details of the manual training department are important at this juncture, more especially as they have been well worked out and have been the model on which the courses of many similar institutions have been based.

1. Measuring and lining exercises.

On a rough board with a two-foot rule and pencil; chalk line, try square, and pencil; bevel and pencil. On a smooth piece with marking gage; try square and knife; and with bevel and knife. On a smooth piece with compasses, straight edge, and knife, making a protractor with 15 degrees divisions.

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2. Sawing exercises, preparation of stock for models.

Rip and cross-cut sawing to pencil lines; rough board resting horizontally on trestles. Rip sawing in gage lines; piece held upright in the vise. Back sawing, square ends and sides of grooves; the pieces resting on bench hook. Sawing kerfs in mitre box. Curve sawing with hand turning-saw and power jig-saw.

3. Sharpening exercises.

Straight and curved edge-tools on grindstone. Sharpening or bevelling 2x6x½-inch white holly on prepared sandpaper block. Whetting straight and curved edge-tools on oilstones.
Applications: plane iron, chisel, gouge, carving tools, cabinet scraper.

4. Planing exercises.

Making plane surfaces; jointing edges and planing to gage lines. Block planing square ends with pieces held in vise. Oblique edge and end planing. Rabbeting, beading, moulding.
Applications: square prism, octagonal prism, hexagonal prism, winding sticks, picture frame, typical joints.

5. Nailing exercises.

Nailing square joints, using cut and wire nails. Toe nailing. Nailing mitre joints.
Applications: nail box, screw box, bracket, picture frame, splice joints.

6. Boring exercises.

Perpendicular boring with auger bits across the grain entirely through. Perpendicular boring to a given depth, both across and in the direction of the grain. Boring with awls, drills, and countersinks.

7. Chiselling exercises.

Sides and bottoms of grooves across and in direction of grain. Oblique surfaces. Inside of boxes. Curved surfaces.
Applications: sliding gage, mortise and tenon, dovetail, oil-stone box, glove box, octagonal tool handles.

8. Gluing exercises.

Rubbed joints. Clamped joints. Dowelled and keyed joints.
Applications: winding sticks, T squares, drawing boards, picture frames, hopper joints.

9. Form work.

Plotting curves from straight lines on plane surface freehand. Plotting curves on curved surfaces.
Applications: coat hanger, bread trencher, hammer handle, octagonal tool-handles.

10. Wood-carving exercises.

Flat and oblique surfaces cut with firmer and skew chisels. Beads and rosettes cut with firmer and skew chisels. Cutting straight and curved lines with veining and parting tool. Fluting and beading with gouges. Geometric designs cut in low relief on flat surfaces. Conventional designs cut in high relief on both plane and curved surfaces.
Applications: pencil tray, book rack, picture frames, stamp box, jewel case, music rack, flower-pot stands.

WOOD-TURNING AND PATTERN-MAKING.

I. Turning between centres—white pine.

1. Cylindrical surfaces, gouge and chisels. Cylinder; gouge. Cylinder; chisel. Double stepped cylinder.
2. Convex curves; chisels. Beads of different sizes. Beads, conical and cylindrical surfaces.
3. Concave curves; gouges. Curves of long radii. Curves of short radii, semicircles.
4. Combinations and applications of 1, 2, and 3. Convex curves, concave curves and cylinders. Convex curves, compound curves and cylinders. Convex, concave and compound curves, cylinders, and spherical surfaces, leaving a square base.

II. Chuck turning.

1. Capital of column. Grain perpendicular to axis; cylindrical, conical, and curved surfaces—white pine.
2. Powder box—cherry.
3. Napkin ring—walnut.
4. Goblet—hardwood, glued up.

SUPPLEMENTARY WORK.

Bench stops—hickory. Gouge, chisel, file, and screw-driver handles. Mallet—maple. Stocking ball—cherry. Rolling pin—maple. Gavel—oak. Dumb bells—maple or cherry. Indian clubs—maple. Balustrade—pine. Micrometer caliper holder—cherry. Towel rings—cherry, Boxes—cherry, maple. Napkin rings—walnut. Cups and goblets—hardwoods glued up. Spheres—cherry. Vase forms—pine.

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III. Pattern making.

Draft, allowance for shrinkage; gear blank. Green sand core, allowance for finish; collar. Split pattern, dry sand core; hollow chuck. Applications of 1, 2, and 3; stand for tool rest.

SUPPLEMENTARY.

Paper weight, blank for taper socket. Collar, face plate. Hanger box, screw chuck. Tool rest, hand wheel, eccentric.

FORGING.

1. Description and operation of forge, and care of fire.
2. Names, characteristics, and uses of tools.
3. Typical processes: drawing, shouldering, forming, bending, upsetting, twisting, scarfing, welding, punching, hardening, and tempering.
4. Sources and properties of materials: common iron, Norway iron, Bessemer steel, open-hearth steel, and crucible steel.
5. Applications: butt ring, hook and staple, bolt, nut, timber hanger, bracket, eye bolt and ring, chain and hook, tongs, centre punch, cold chisel, cape chisel, spring, lathe tools, square reamer.

MACHINE-SHOP PRACTICE.

1. BENCH WORK.

1. Chipping and filing of plain surfaces—cast iron.

Use of measuring and marking tools. Chipping narrow surfaces with flat chisel. Chipping broad surfaces with cape and flat chisel. Filing flat surfaces and testing with straight edge.

2. Drilling cast iron—finished model No. 1.

Accurate location of holes. Action of flat drill.

3. Chipping and filing of curved surfaces, and plain surfaces at right angles—cast iron.

Testing with a try square. Filing a convex surface. Chamfering curved and straight edges. Draw filing, and polishing with emery cloth.

4. A sliding fit—cast iron.

Production of parallel surfaces, testing with calipers. Fitting piece to slide in groove of fixed dimensions.

5. Drilling and chipping—wrought iron.

Use of twist drill. Key seat chipping. Use of round-nose chisel. Use of hack saw. Chipping in corners.

6. Surface plate—cast iron, brass handles.

Planing a flat surface. Drilling and tapping. Hand turning in brass. Use of die. Scraping.

7. Surface gage—cast iron, malleable iron, machinery steel, cast steel.
Extension of processes of chipping, filing, and fitting, with introduction of new forms of tools. Hand-lathe work on steel. Tempering. Assembling finished parts.

8. Paper-weight,—composition metal.
Hand turning. Polishing and lacquering.

9. A set of lathe tools.
Shaping faces that form a cutting edge.
Supplementary exercises. Calipers, hammer, binding posts, brass ornaments, skate runners, and projects of a simple nature. Simple machine tool work on stock for class exercises.

II. MACHINE TOOL WORK.

10. Stepped cylinder,—wrought iron.
Centering. Squaring ends with side tool. Use of parting tool. Roughing with diamond point. Finishing surfaces,—dry, with soda water, and with emery cloth and oil.

11. Perfect cylinder,—cast iron.
Truth of live centre. Alignment of the dead centre; geometrical relation of the axis of revolution to the tool path.

12. Stepped cylinder,—finished model No. 11.
Determination of size:—With spring calipers set by steel rule. With spring calipers set by standard reference guage. With micrometer calipers. With standard caliper guage.

13. Taper sleeve and plug.
Use of lathe chuck. Use of chuck drill. Production of conical surface by compound rest. Production of conical surface by adjusting the dead centre.

14. Right and left hand screw.
Principles of screw cutting. Knurling and finishing.

15. Elements of machines that involve the use of chucking reamers, hand reamers, mandrels, boring bar, back rest, face plate, and taper attachment.
Examples: Pulleys, gear wheels, eccentrics, lathe spindles, steam-engine cylinder, lathe centres. These pieces may call also for work upon the planer, shaper, milling machine, or grinding machine.

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III. Construction of Machinery.

A hand lathe, engine, dynamo, or other machine or piece of apparatus is built by a group of pupils each pupil making and assembling several closely related parts.

MANUAL TRAINING HIGH SCHOOL, PROVIDENCE.

COURSE OF STUDY.

The small figures after the studies designate the number of exercises a week; the figures in parentheses, the number of weeks the studies are taken.

A period means 45 minutes. All periods in manual work are double periods.

School sessions from 9 a.m. to 3 p.m., with a half hour recess for lunch, which is served in the building

First Year.

I. Academic Work:

Literature.

Elementary Rhetoric and English Composition^{4} (40). American Literature and Authors^{1} (40).

Mathematics.

Algebra^{4} (40). Arithmetic^{1} (40).

Science.

Physiography^{5} (20). Bookkeeping alternating with Physics^{5} (20).

II. Manual and Art Work:

Drawing^{5} (40).

Lettering and Geometrical Figures. Working Drawings in connection with Carpentry. Geometrical Figures. Drawing from Models—Freehand. Drawing from Casts—Historic Ornament. Elementary Designs—Plant Forms.

For Boys.

Carpentry and Joinery^{5} (20). Smithing and ornamental iron work^{5} (20).

For Girls.

Sewing^{5} (20). Carpentry^{5} (15). Emergency Notes. Physiology and First Aid to Injured^{5} (5).

Second Year.

I. Academic Work:

Literature.

Ancient and Mediaeval History$^{2\frac{1}{2}}$ (20). English Classics and Composition$^{2\frac{1}{2}}$ (20). English History fundamental to American Institutions$^{2\frac{1}{2}}$ (20). German$^{2\frac{1}{2}}$ (20).

Mathematics.

Geometry^{5} (40).

Science.

Physics alternating with Civil Government^{5} (20). Physics^{5} (20). General Chemistry—Girl's course preparatory to cooking^{5} (20).

II. Manual and Art Work:

Drawing^{5} (40)—*For Boys.*

Designs in Wrought Iron. Geometrical Figures. Orthographic Projection. Elementary Machine Drawing—Freehand. Designs for Wood Turning—Classic Forms.

For Girls.

Historic Ornament for Woodcarving Designs. Values in Light and Shade. Pen and Ink Rendering. Charcoal—From Casts and Objects.

For Boys.

Clay Modelling and Woodcarving^{5} (20). Smithing—Toolmaking and ornamental wrought iron^{5} (20).

For Girls.

Clay Modelling and Woodcarving^{5} (20). Science of Cooking and cleaning^{5} (20).

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THIRD YEAR.

I. ACADEMIC WORK:

Literature.

(a) German[3] (40). (b) English Literature and Composition[2] (40).

Mathematics.

Algebra completed[5] (10). Plane and Solid Geometry[5] (30). Mensuration.

Science.

Physics of Heat, Light and Electricity[5] (20). General Chemistry[5] (20). Structural Botany[5] (20).

NOTE. Girls take Physics for first half and Botany second half year.

II. MANUAL AND ART WORK:

Drawing[5] (40).

Building and Construction[5] (20). Mechanical Drawing or Architecture[5] (20).

NOTE. At the middle of the third year a choice is offered between a course of Mechanical Drawing or Architecture, extending through the remainder of the student's course.

For Boys.

Wood Turning and Patternmaking[5] (20). Molding and Foundry Work[5] (10). Vise Work[5] (10).

For Girls.

Chemistry of Food and Science of Nutrition[5] (20). Millinery and preliminary work in Dressmaking; water colors, drawing in connection with millinery and designs for embroidery[5] (20).

FOURTH YEAR.

I. ACADEMIC WORK:

Literature.

German[5] (40). English Literature[2] (40).

Mathematics.

Review Algebra and Geometry[5] (10). Trigonometry and Surveying[5] (10). Field Work in Surveying[2] (20).

Science.

Analytical Chemistry[5] (20). Electrical Engineering[5] (10). Photographic Science and Engraving[5] (10)

II. MANUAL AND ART WORK:

For Boys.

Mechanical Drawing or Architecture.

For Girls.

Charcoal Drawing from the Antique. Theory of color. Pen and Ink work—Copies and from life, for expression of taste and form in designs, for Dressmaking. Designs for Book Covers and Illustrations.

For Boys.

Machine Shop Practice[5] (40).
Steam Engineering[5] (6).

For Girls.

Household Sanitation; Study of Yeasts, Moulds, and lower forms of life; Home Nursing[5] (20).
Dressmaking[5] (20). Psychology in place of Electrical and Civil Engineering.

In both Boston and Providence, the commercial courses which we find in the Brooklyn and Chicago Manual Training Schools, are provided in the English High Schools.

WOODSTOCK (ONT.) COLLEGE.

So far I have dealt with the manual training schools of the United States. I visited also the college at Woodstock, Ont., the pioneer in 1889 of manual training in Canada. Here the department is optional, and a fee of $9.00 a year is charged to cover the cost of material. The object of the course, from the college standpoint, is purely educational—to develop the boys' practical nature; the boys take it because they like it and because they find it will be useful to them in after life. No attempt, however, is made to produce articles for the market or to teach a trade. The department is in charge of Mr. D. K. Clarke, B.A., who is also modern Languages Master and who acquired his knowledge of manual training after he had graduated—both facts suggestive to the Ontario High School Master. The course given in outline below, is taken daily during the regular school

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hours, the periods for the first and second years being each three-quarters of an hour, and for the third an hour :

FIRST YEAR.—Drawing, Freehand, Practical Geometry and Perspective, drawing to scale all shop exercises, Carpentering, Woodturning, Construction.

SECOND YEAR.—Drawing, Object Drawing, Mechanical and Industrial Design—Joining and Turning in hard and built-up woods, Pattern-making, Wood-carving.

THIRD YEAR.—Mechanical and Architectural working drawings, Blacksmithing, Forging, Welding, Tempering, Brazing.

Machine Work, Chipping, Scraping, Filing, Planing, Milling, and Lathe Work.

Mr. Clark tells me that the time devoted to the subject in no wise impairs the character of the students' other work, but that, on the contrary, they take a higher average than the rest of the school. It is found also that careless boys often become interested in the subject and that this interest produces a general improvement in their other class work, and, what is more important still, in their conduct. This conclusion is supported, I find, by the superintendents of the United States Industrial Schools, who testify to the beneficial effect produced by manual training in the moral regeneration of the criminal and his interest and advancement in other work. All this we might conclude *a priori* from Psychological laws, but the average citizen is more impressed by the evidence of their operation. Mr. Clark also adds—and this too is significant—that the students who take manual training usually remain at school for a longer period than the others. The average citizen, again, looks with suspicion on the testimony of the specialist as to the value of his subject. Mr. Clark's opinion is supported by others who are familiar with the evidence. The Principal and the rest of the faculty have always been unanimous in their appreciation of the value of manual training in their educational work, and the governors of the school have shown their appreciation in the most practical way, by spending about $10,000 in erecting and equipping a special building. Most of the evidence we have on this subject is foreign. We have here the evidence of a staff which has tested manual training for over ten years in our own Province.

MANUAL TRAINING IN THE GRAMMAR SCHOOLS.

From various causes, few of the cities I visited have even a fairly complete system of manual training; that is, a system correlated, on the one hand, to the kindergarten and, on the other, to the industries. The most comprehensive I saw was in Chicago. As reported to me by Mr. Robert M. Smith, M.A., the very able supervisor in that city, there are 60 centres with 35 teachers. The statistics of the enrolment of the pupils taking manual training are as follows :—

Grammar Schools: Grade I. 1,400, grade II. 1,650, grade III. 2,800, grade IV. 20,000, grade V. 21,019, grade VI. 40,715, grade VII. 30,813, grade VIII. 24,916.

Manual Training High School, 632.

Besides these public schools there are also private institutions. The Chicago Manual Training school was established in 1883 by the Chicago Commercial Club and has recently been transferred to the University of Chicago. This was the first school of the kind in the western states. It is of the High school grade, charges high fees, and is attended by 280 pupils. The other, the Jewish Manual Training school, in the "Ghetto" of Chicago, is maintained by subscriptions. Its building and site cost $91,250, with accommodation for 650. It is attended chiefly by the children of poor Russian Jews and is of the elementary grade, corresponding to the Hebrew Technical Institute of New York, which I will describe further on. Manual training is also taught in the Dewey Grammar school, a sort of experimental elementary school associated with the Department of Pedagogy of Chicago University. There and in the Chicago Institute (under Col. Parker) I found some of the latest phases of this and other educational movements.

All the other cities I visited had manual training in some part of the system, but in some, as in Albany, and Providence, it is confined to the High school, and in others, as in Utica, to the Grammar schools. In the Boston Grammar schools wood-working is confined to the 8th grade of boys, with a total of only 2,126. The cost has been the chief obstacle in all these cases; for, although wealthy, the populous centres have many other demands upon them. In Providence, for example, both manual training and domestic art were given up in the Grammar schools on the establishment of the Manual Training High school. In Chicago, however, although, as Mr. Smith tells me, in times of

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financial stringency, the local economists systematically propose to abolish the Manual Training department, the agitation has heretofore always ended in a greater extension of the system.

As in the High Schools, associated with Manual Training and often included under the same head, I found the Domestic Arts (sewing and cooking). These subjects being of evident utility are oftener found in the elementary schools than Manual Training. They are, of course, taken by girls, sometimes along with wood-work; usually in place thereof; but it is by no means uncommon to find boys also taking sewing and even cooking. I may add, in passing, that very properly, a course in cooking is a recognized part of the curriculum for M. D. in the Harvard Medical department. In the Grammar Schools the teachers of Domestic Art are women. So, too, usually are the teachers of Manual Training. In Boston, for example, there are 20 special female instructors in cooking, 40 in sewing, and 18 in Manual Training, there being 7 male teachers also of the last named subject. With our Ontario prejudices, it will seem strange that working in wood should be taught by women; but, as I have already said, this is naturally regarded by educationalists as the best feature of the organization. Most, indeed, of the elementary teachers I saw were women, and most of the students in Mr. Larrson's and the other training classes were also women. Sometimes the teachers take these subjects in addition to their other work, but in the larger cities and where the Grammar School is large, the teachers are specialized. The centre system in particular (the system adopted in Brockville, Ottawa, and Toronto) is found to be both effective and economical. In some other cities, the teacher goes from school to school; but, in the case of cooking and manual training, this entails considerable expenditure for accommodations and equipment. Of all the Grammar Schools I saw, the equipment and organization of the William T. Lincoln School in Brookline seems to me to be the best. It is under the principalship of a woman and showed every sign of being ably managed. It is exceptional in having not only the usual Grammar School equipment but also a physical and a chemical laboratory like those in our smaller High Schools. For Domestic Art it is also well equipped, Sewing and cooking are taught by special teachers, and its outfit includes a room for cooking and a well furnished dining room In its two higher grades it is practically a High School. Probably the work there is as much as many of our Schools can attempt, and I accordingly give its programme. The average age of pupils in the ninth grade is over 15. The total time given Manual Training and Domestic Art in the Brookline Grammar School is 50 minutes a week in grades I—III, 60 in grades IV and V, and two hours in the higher grades. Latin and French, which are taken in grades VII—IX of the other Grammar Schools of the city, are not taught here, but more time is given to Domestic Art and Manual Training.

BROOKLINE GRAMMAR SCHOOL.

MANUAL TRAINING.

The Kindergarten, Gifts and Occupations:

Grade I. Selected Kindergarten occupations work in connection with other studies.
" II. Paper cutting and folding. Construction work in connection with number, language and history.
" III. Clay modelling and card board work.
" IV. Knife work with wood of two dimensions.
" V. Advanced work with knife and simple tools.
" VI. Mechanical Drawing, Models constructed from drawings with the use of suitable tools.
" VII. Mechanical Drawing, Projections of geometrical solids, working drawings. Advanced Sloyd and wood-carving.
" VIII. Mechanical Drawing, work of Grade VII continued. Designs copied and original wood-turning.
" IX. Mechanical Drawing continued. Bench work. Elementary Cabinet making.

As will be seen from the scheme which I give in Part II. of this report, drawing is also taken up in its other aspects.

DOMESTIC ART.

Grade III.—Use of scissors. Short seams. Basting, stitching, back-stitching, running, hem felled, versewing, overcasting, hems measured and finished. Supplementary work. Work-bag of checked inen.

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Grade IV.—Three inch model of French seam. Mark name by stitching. Hemmed-on patch. Stitched-in patch. Supplementary work: White muslin apron with drawing string.

Grade V.—Oversewed patch used on lighter cloth. Darning stockings. Making button-holes. Supplementary work: Cooking outfit for sixth year, to be cut and prepared by girls of higher grade.

Grade VI.—General care of house; airing, sweeping, dusting, cleaning, care of beds, table setting, washing of dishes, care of fire, stove and lamps. Make truck measure; fold cloth for trucks; make gusset measure; cut and sew gusset in end of seam; sew gathered piece into a waist-band; button-holes and loops; sew on buttons with tape; whip and sew on ruffle; darning. Supplementary work: white cloth skirt.

Grade VII.—Water and its effect upon foods. Milk as a typical food. Fat in cooking. Experiments with albumen and starch. Cooking of eggs, vegetables and cereals. Bind white cloth sampler with thirty-five different models of sewing. Supplementary work: Diagrams for undergarments drafted from measurements; study different qualities of cloth.

Grade VIII.—Combinations of starch and proteid. Cooking of fish and meat, meat soups and gelatine dishes. Yeast bread. Baking powder mixtures. Study flannels of different weight and their adaptation to different uses. Materials for stockings. Ginghams and muslins. Fine darning. Use of sewing machine. Supplementary work: Flannel skirt finished with slight embroidery; hem-stitched undergarments; Mexican work; lace work.

Grade IX.—Canning of fruit and jelly making. Plain pastry, cake, simple puddings, salads, frozen dishes. Invalid cookery. Shirt waist cut and fitted and made on machine. Dress lining fitted by the "art of pinning on." Dress cut, fitted and made. Hooks and eyes. Sewing on of braid, etc. Millinery begun. Notes taken of all lessons.

KINGSTON (ONT.) PUBLIC SCHOOLS.

Manual Training.

Here I give also the scheme for elementary Manual Training in the Kingston (Ont.) Public Schools, now partly in operation, and to be carried out before long in all its details. Cooking has not yet been added, but, no doubt, it will soon come. The undertaking is a modest one compared with that of the Brookline School, and should not be beyond the capabilities of even our smallest city and town schools. The cost here will not be the obstacle so much as the lack of competent teachers. A scheme like this, with elementary Sloyd in Form IV, should also be practicable in the larger centres.

FOR BOYS AND GIRLS.

First.

Junior Part I.

Holding pencil, drawing lines, stick laying, use of colored tablets for simple designs and borders, paper folding, sewing.

Senior Part I.

Drawing lines and combining them into simple geometric figures, stick laying, use of colored tablets paper folding, sewing.

Part II.

Freehand drawing, consisting of lines and simple objects, stick laying, use of colored tablets, paper cutting and folding, sewing, Nature study.

Second.

Drawing, freehand and object, paper folding and cutting into ornamental patterns, sewing, Nature study, leaves, their outlines, forms and surfaces, color work with crayons.

FOR BOYS. FOR GIRLS.

Junior Third.

FOR BOYS.	FOR GIRLS.
Freehand drawing. Object drawing, freehand and with rulers. Nature study from objects only accompanied by color work with crayons. Cardboard work, cutting, scoring, folding into geometric solids.	Drawing, freehand and object. Nature study from objects only, accompanied by color work with crayons. Sewing.

Senior Third

FOR BOYS.	FOR GIRLS.
Freehand drawing. Object drawing with rulers and squares. Nature study from objects, with drawings. Coloring of patterns and drawing. Designs in water color. Cardboard work. Chip carving and cutting.	Freehand and object drawing. Nature study from objects with drawings. Coloring of patterns and drawings. Designs in water colors. Sewing and making of simple articles.

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JUNIOR FOURTH.

Freehand drawing.
Object drawing with rulers and squares.
Geometric drawing.
Nature study from objects, with drawing and water color sketches, leading to simple designs for ornamentation and use.
Chip carving and cutting.

Freehand and object drawing.
Making simple designs.
Nature study from objects, with drawing and water color sketches.
Designs in water colors for ornamentation and use.
Sewing, cutting, and making simple garments and other articles.

SENIOR FOURTH.

As in Junior IV. Continued.

As in Junior IV. Continued

HEBREW TECHNICAL INSTITUTE.

A peculiar development of the manual training movement—the Hebrew Technical Institute of New York—deserves special notice. I had been advised to visit this institute as one which had grown up under adverse conditions and which accordingly presented some exceptional features. It happened to be a Jewish holiday when I visited the school, but, owing to the courtesy of the principal and another member of the staff, I had an opportunity of discussing the situation and of inspecting the building and the equipment. The school has been in existence over 17 years, and is supported by the voluntary contributions of the Jewish community. Until recently, none but Jews were admitted, but it is now open to all comers. So far, however, none but Jews have presented themselves. Tuition books, tools, are all provided free. To be admitted a boy must be over 12 years of age. The average age of the senior class is, I find, about 16, and, so far as I could ascertain, the academic standard corresponds to that of our public school 3rd, 4th and 5th forms. The school is peculiar both because it represents a lower grade than the Manual Training High School, and because it professedly partakes of the nature of a Manual Training School, a Polytechnic Institute, and a Trade School. As a matter of fact, though, its courses seem to me to differ from those of the Manual Training High Schools only in being of a more elementary character and in emphasizing the economic side of the course. In many respects the work resembles that done in the Toronto Technical (Evening) School as at present organized. During the first two years the pupils are instructed in those subjects that will be of use to them, whatever pursuit they finally choose; and, in the third and final year, they give special attention to that branch of work which is most agreeable and suitable to each. Some of the graduates of the school continue their studies in the higher Polytechnic and Engineering Schools; but the large majority eventually become skilled mechanics of various kinds, foremen in wood-working and metal-working shops and the different electrical industries, and draughtsmen in architects' offices and manufacturing establishments. Below I give its programme, as the courses are typical of another class of school and may prove suggestive in those localities in Ontario which may begin the technical work in the Public Schools and continue it into the High Schools.

COURSE OF INSTRUCTION.

The methods of instruction include recitations, lectures, laboratory practice, and shop work.

JUNIOR YEAR.

ENGLISH STUDIES.—Reading; Spelling; Definitions; Penmanship (vertical system); Language Lessons; Exercises in Composition and Letter Writing; American History; Elementary Geography; Map Drawing.

MATHEMATICS.—Arithmetic: Common and decimal fractions; denominate numbers; square root.

Geometry: Study of form; plane mensuration; inventional geometry.

APPLIED SCIENCE.—Properties of matter; elementary laboratory work; simple experiments in electricity.

Experimental chemistry; construction of simple apparatus at home.

MECHANICAL DRAWING.—Instruction in the elements of drawing; handling of instruments; exercises in the use of T-square and triangles; working drawings of joints and bench exercises; lettering.

FREE-HAND DRAWING.—Object Drawing: Solids with straight edges, single and in groups; sphere and cylinder: practical applications.

Decorative Drawing: Construction of rectilinear plane figures based upon the square: borders in Greek and other styles: practical applications. The circle, regular triangle, and polygon; simple rosettes; oil-cloth patterns; use of water color.

WOOD WORK.—Pasteboard models; uses of the bench and the chief wood-working tools; principal characteristics of woods; construction in thin wood, using the bracket saw; exercises with plane, chisel, saw, and other tools; joints and articles illustrating their use.

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Middle Year.

English Studies.—Language Lessons; Composition; Letter Writing; Business Forms; Penmanship (vertical system).
History of the United States completed.
Biographies of eminent men of America, and its political and scientific developments.
Geography, completed; Map Drawing.
Industrial Topics; Study of Woods.
Mathematics.—Arithmetic, completed.
Algebra, taken up by those who finish Arithmetic before the close of the year.
Plane and solid mensuration.
Applied Science.—Physics; mechanics; heat; light; sound; laboratory work.
Electricity; laboratory work in static electricity and magnetism.
Mechanical Drawing.—Working drawings for bench and lathe exercises; geometrical drawing; projections and drawing as applied to machine-shop exercises; elementary architectural drawing; lettering; blue-printing.
Free-hand Drawing.—Object drawing: Cylinders; wheels; cones; vases; classic and modern forms; practical applications. Home lessons.
Decorative drawing: Conventional flowers and leaves; rosettes; borders; compound flower ornaments; waving and spiral lines. Ornaments based on practical forms; wall paper designs; water colors.
Wood Work.—Exercises in joining and constructive carpentry.
Lathe work: Centre work; face plate work; geometric solids.
Construction work: Joints; model of a window sash; model of a locked box.
Wood carving.
Metal Work.—Instruction in the quality and manufacture of brass and iron; use of the different chisels, files, and small tools; chipping and filing; speed lathe work; use of drill-press, planer, and shaper.

Senior Year.

The student pursues all the studies of the general course, and, in addition, those of one of the four special courses.

General Course.

English Studies.—Grammar; American and English literature; essays; physical geography; industries and natural resources of the United States.
Talks on woods, metals, coals, building materials, and kindred subjects.
Lectures upon general science, illustrated by stereopticon views; upon the preservation of health; upon the duties of citizenship.
Mathematics.—Physical arithmetic as applied in the laboratory.
General review and final examination in arithmetic.
Algebra.
Plane and solid geometry as applied in the shops.
Applied Science.—Physics: Experimental mechanics; advanced laboratory work; construction of apparatus.
Electricity: Electricity and magnetism as applied to the telegraph, telephone, lighting, transmission and distribution of power.
Primary and storage batteries; electric heating and welding.
Chemistry: Lectures and elementary experiments; laboratory work.
The application of chemistry as in soldering, brazing, the making and use of varnishes, paints, oils, and insulating materials. Electro-chemical action.
Steam engine: Practical illustration in the engine room; boilers, pumps, and valves.
Mechanical Drawing.—Cabinet projection; working drawings for pattern making; working drawings for machine-shop exercises; architectural and machine drawings. Lectures upon machine designs and mechanics.
Free-hand Drawing.—Drawing from casts, flowers, and fruits; practical applications to decorative work; sketching.
Wood Work.—Advanced lathe work; pattern work, moulding and casting; cabinet work; veneering and polishing; construction work in carpentry.
Metal Work.—Elementary exercises on speed lathes; turning on engine lathe; planing; drill press exercises; gear cutting; tool making.

Special Courses.

(*a*) Mechanical Drawing, Two Hours per Day.—Parallel and angular perspective; architectural drawing; foundations; piers and walls; floors, roofs, and stairways; structural iron work; round writing; artistic lettering; tinting.
Machine drawing: Isometric and cabinet projection; wheel gearing; boiler settings; details of steam engine and dynamo; details of special machines, assembled drawings.
(*b*) Wood Working, Two Hours per Day.—Advanced pattern making at the bench and lathe; moulding and casting in lead; carpentry work; cabinet work; wood carving.
(*c*) Metal Working, Two Hours per Day.—Machine work: Building some machine or apparatus, as speed lathe, dynamo or galvanometer; thread cutting, inside and outside; use of milling machine; reaming and boring; making taps, chucks, and face plates; gear cutting; tool making.
Tempering and grinding tools; die sinking; forging.
(*d*) Practical Electricity, Two Hours per Day.—Lectures and recitations two hours per week.
Experimental work: Electro-magnetism; primary and storage batteries; dynamos and motors; electrical measuring with amperemeter; voltmeter and Wheatstone bridge; electrical testing of dynamos, motors, and arc lamps; construction of apparatus for use in demonstrations and experiments.

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Trade Schools.

To the trade schools I gave no special attention. So far as I could ascertain, there is no systematic provision for them outside of the State-supported industrial schools for criminals. They are the outcome of private effort, occasionally helped by State and municipal grants. The State of Massachusets, for example, has a standing offer of $25,000 to any city or corporation which will establish a textile school under certain conditions. As I have already pointed out, evening trades' classes are associated with some of the manual training and higher technical schools. There are also such special or monotechnic schools as the Lowel Textile School and the textile school recently established at New Bedford (Mass.) which teach the theory and practice of cotton manufacture, the construction and operation of the machinery, and the artistic principles involved in the production of desirable and ornamental fabrics. These are intended for pupils who have taken the grammar school course, and are maintained in connection with the local factories. Other similar schools are the Rhode Island School of Design (Providence) for artisans, with courses in drawing, painting, modelling, and designing, supported by subscriptions and small grants from the city and the State; the Franklin Institute (Philadelphia), an endowed school with courses in elementary mathematics, drawing, and naval architecture; and the New York Trade School. The last mentioned may be taken as the best type. For the following particulars I am indebted to Mr. James Russel Parsons, junior, Secretary of the Board of Regents, Albany: Total annual expenditure $37,266; a staff of 30 instructors, with about 600 pupils; a merely nominal fee which meets but a fraction of the cost. Evening classes in bricklaying, plastering, plumbing, electrical work, carpentering, house painting, steam-fitting, fresco-painting, blacksmiths' work, tinting, sign painting, sheet-metal cornice work, and drawing. Day classes: Plumbing, house and fresco painting, sign-painting, sheet metal-cornice work, bricklaying, plastering, carpentering, steam and hot-water fitting, and electrical work. A certificate is given to those whose work has been satisfactory. The school is liberally endowed by private philanthropy.

The report of the United States Commissioner of Education does not give the trade schools separately. They are enumerated with the manual training schools, and the list is admittedly incomplete. Certainly, however, there is no such development as we find in Germany, and they owe their existence and maintenance chiefly to private enterprise. The trade school is comparatively new to the United States. It has been long established in Germany, where its existence is due as much to the character of the people as to their economic necessities. There a boy's career is usually marked out for him from the first. If his father is a workman, he becomes one, too, or he follows the trade of the locality. And he usually remains a workman; his chances of rising are few. In the United States there is no such fixity; it is foreign to the genius of the people, and the intelligent boy has "all the world before him where to choose." As has been well said, "In Germany society is stratified horizontally." There, too, the technical system has for its object better economic production. The theory in the United States is that the advancement and development of the individual are the main objects; the economic one is secondary.

Normal Training Institutions.

An account of manual training in the United States would be incomplete without a reference to that very important branch—the professional training of the teachers. The wholly erroneous theory that, to make a good manual training teacher, all that is needed is intelligence, and the technical skill of the mechanic has, in some localities, brought discredit upon the department. Technical skill, although to a certain extent essential, is really not the most important qualification. The teacher—the elementary teacher in particular—must be an intelligent and trained student of the laws that govern the healthful growth of the young body and mind, and be able to determine and apply the best means of training the creative faculties in accordance with these laws. The skilled mechanic is very generally a failure, especially with young children. We might infer the truth of this proposition *a priori*, but, in the experience of some localities in the United States, we have have had a practical demonstration. The poor work I saw—and

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I did see some very poor—was always by this class of teacher. Manual training is an educational subject; and, to secure satisfactory results, the men or the women who teach it must have a good general education and professional training as well as the necessary special knowledge and skill. With an added special course (take the case of Mr. Clarke, of Woodstock, for example) the trained teacher can do this work also, and so remove what is often the chief obstacle in the way of introducing a new subject.

As I have already said, the Drexel Institute provides normal classes in manual training, and in domestic art and science; and the Pratt institute, in the latter. The two best of the other training schools I visited were the Sloyd Training School, of Boston, under the principalship of Mr. Gustav Larrson, and the Teachers' College of Columbia University, New York. In the latter as well as in the Framingham Normal School, Mass., there are also normal classes in domestic art and science. But, notwithstanding this and much other provision for training teachers, there is still a great dearth owing largely to the rapid progress of these departments.

The Sloyd Training School was established by Mrs. T. A. Shaw in 1888. It represents private experimental work in the interests of education and offers free instruction to teachers in mechanical drawing and wood work, and in the pedagogical bases of the subject. Connected with the training school proper is a room for classes of children (the building is one of the city "centres") which provide opportunity to the normal students for observation and practice. Mr. Larrson's system—the system, indeed, which has survived in the Boston grammar schools, and is most prevalent in the States—is known as American Sloyd, and he himself is recognized, I believe, as its best practical exponent in America The Teachers' College is the professional school of Columbia University for the study of education and the training of teachers. It takes academic rank with the schools of law, medicine, and applied science. Its course is a very full and comprehensive one, and its buildings and equipment are amongst the finest I saw—certainly the finest for normal school purposes. For this faculty, the University grants diplomas, but no degrees as yet. Special features are its Fellowship and Scholarship fund of $5,750 annually, and its loan fund for needy and worthy students. Its fees, however, vary from $100 to $150 in the manual training department, and from $75 to $150 in domestic science and art. Connected with it are two schools of observation and practice—the Horace Mann School (with higher fees) for observation only, and the Experimental School, attended by grammar school pupils, for observation and practice. Both schools have kindergartens (3 years to 6) and a grammar school department, while in addition the Horace Mann School has a High School, with a four year's course, and the Experimental School is a centre for instruction in sewing, cooking, and manual training. The pupils of both schools take the classes in manual training and domestic art. Here, as well as in Mr. Larrson's school, the normal courses for teachers of elementary and of secondary schools are each of two years; but the time may be abridged in the case of students who possess exceptional ability.

What Mrs. Shaw has done for manual training in Boston, the late Mrs. Hemmenway, of the same city, did for domestic science and art. The Boston Normal School of Cookery was founded by her in 1887, and maintained till 1898, when her trustees transferred it to the Framingham Normal School, situated about 25 miles from Boston. Here a large handsomely furnished room is devoted to the cooking department, and the subject is made a prominent feature of the curriculum. The girls in the 8th and 9th grammar grades of the town come to the school once a week for lessons in cooking. These grades are broken up into a number of classes and are taught by the seniors, each having charge for a year and being assisted by the juniors, who in this way have a year's observation and practice to prepare them for assuming the full management in the second year. The practical part of the work I found especially instructive. The students do the marketing in the town, and even in Boston, where they also visit the kitchens of some of the larger hotels. Economical buying and a good knowledge of material thus go hand in hand with the ordinary school course. Indeed, what is especially noticeable in all the American schools is the eminently practical character of the courses. In Framingham there is also a manual training department which follows the Sloyd system and in which all the seniors must spend some time each week. I saw nothing in this Normal School which we should not be able to secure at once in our Normal College, and before long in our Normal Schools

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From the preceding account of manual training and technical education in the United States, it must be evident that the provision therefor is, in some respects, strikingly different from that of Germany, which I have already described. In the United States the apprenticeship system has almost entirely disappeared. In Germany it is still in existence, reinforced by compulsory supplementary training of an elementary general as well as technical character. In the United States, where education is a matter for local control, there is no general system of technical education, and what there is is still in its beginnings, and, in some important respects, both opinion and practice are yet unsettled. In Germany, on the other hand, where the state has full control even when it gives no grants, there is an elaborate and well organized system of intermediate and higher technical education which has existed for over a quarter of a century. And what is equally important, Germany differentiates the general from the technical; the United States does not. Both systems are of course the natural products of the different conditions and the different characters of the people.

The Situation in Ontario.

For a year or so there has undoubtedly been a well marked, though limited, movement in this province in favor of domestic art in our schools and, to some extent, in favor of manual training. This is probably due as much to the widespread feeling that, in some respects, our courses are not practical enough, as to the progressiveness and liberality of individuals. A further impetus has been given to the movement in favor of manual training by the efforts of the Ontario Manufacturers' Association to secure a share of attention for the industrial interests.

So far as I know, no important provision has been made in Ontario for instruction in the household arts except in the Ontario Normal School of Domestic Science and Art in Hamilton (opened in 1900) which we owe to the energy of Mrs. Hoodless of that city, and the Victor School of Household Science and Art in Toronto, which was established by Mrs. Lillian Massey-Treble, to whose munificence the city is indebted for what is undoubtedly the finest school of the kind I have seen. Both of these schools provide special courses for teachers as well as for all other classes of students. These courses, so far as I can judge, are at least the equals in every way of the best in the United States. Sewing is, I believe, taken up in a few of our public schools, but as yet to only a very limited extent. To Sir William MacDonald of Montreal, the generous benefactor of McGill University, Ontario owes the manual training department of the public schools in Brockville, Ottawa, and Toronto, all of which (with others in the other provinces) he has equipped and proposes to maintain for three years as an object-lesson to the people of Canada. For some years the Kingston Board of Education has had carving and some other simple forms of manual training systematically taught in its public schools by a specially trained teacher. Last year it established also a manual training department in its Collegiate Institute, and a similar department is under weigh in connection with the Public Schools and Collegiate Institute of Brantford. Here I must include the manual training department of Woodstock College, so far the best equipped of the class in the Dominion. We have also, of course, the mechanical and industrial departments of our Art Schools, but the courses there lack the vitalizing elements of the manual training schools. Of evening classes of a somewhat technical nature, we have a very few, the result of voluntary effort in one or two of our cities. There are, I find, only two such classes in connection with our Mechanics' Institutes. But, from financial and other causes, all these are as yet an inconsiderable factor in provincial education. The most important institution in this connection is the Toronto Technical school, established and maintained by the city of Toronto. As I will refer to it further on and as it should eventually become the leading intermediate technical school of Ontario, I submit a statement of its accommodations, equipment, and courses. I visited it last month with Dr. McMaster, the principal, and am indebted to him for particulars. The cost of the building and its equipment will total about $83,000. It contains as follows: 17 lecture and demonstration rooms, with ample provision for drawing and modelling, 3 lecture rooms for chemistry, mineralogy, and domestic science, with 26 other rooms, waiting rooms, private rooms, store rooms, etc., and a salesroom for students' supplies. The heating and ventilation are excellent, but the position of the windows and the size of the corridors might be more suitable. Al-

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though it is the old building of the Athletic Club remodelled, the work has been surprisingly well done, and the accommodations compare very favorably with those of most of the United States manual training schools. At present it has a staff of thirteen teachers and provides only evening classes for artisans and others. There are now 1,128 on the roll. Applicants must be at least fourteen years of age and must possess a working knowledge of the elementary public school subjects, but the grading in the school is based on their mathematical attainments. The work is arranged in the following departments: (1) physical science, (2) mechanic construction, (3) architecture and building construction, (4) chemistry, (5) industrial design; with special courses in (*a*) domestic science and art, (*b*) mineralogy, geology, and metallurgy, (*c*) electricity, steam, and gas engines, (*d*) clay modelling. The accommodations and equipment of this school differ from those of similar institutions in the United States in having no "shops," or mechanical laboratories.

This is all of importance that has been done so far for elementary technical education in this province, and the attendance more than justifies the provision. As a further proof of the necessity of extending the system of technical evening classes, I may add that I have been informed in various trustworthy quarters that the International Correspondence Schools of the United States do a "roaring trade" with the young mechanics of our cities and towns. Indeed, in my inspectoral work I have occasionally come across the agents of these institutions in the hotel sitting rooms, surrounded by young men from the local factories who were arranging for their courses. Whether these correspondence schools can be made to take the place of technical evening classes where such are not available, is still a question unsettled from the educational point of view. But there is no doubt of their financial success. The oldest of them is said to have no fewer than 200,000 students on its roll, with thousands from Ontario! Nor, with such a showing, can there be any doubt as to the necessity of supplementary technical training for artisans.

As to Trade Schools: The only real one we have in Canada is the Canadian Horological Institute, under the direction of Mr. H. R. Playtner, who opened it in Toronto some years ago. The school occupies a flat, and the building is well lighted and convenient. About $5,000 has been spent on the equipment. For young men with some experience there is a one year's course and the fee is $165 or $180. A full course for those without experience is two years; the fee being $330 or $360. The school has sometimes an attendance of about 30—there were 16 present when I visited it—and its efficiency is vouched for by competent judges and the success of its pupils. There are also in Toronto, I believe, two private schools for opticians, one in connection with a manufactory; and in St. Thomas the M.C.R. provides evening classes for its apprentices.

In the highest work of a technical system this Province has made a good beginning in our School of Agriculture at Guelph, and our School of Practical Science at Toronto, both state-maintained institutions. Queen's University, Kingston, has a faculty of Applied Science (with "shops"), and a School of Mines; the latter being partly state-supported also. The students of these schools are in much demand and there is an overflowing attendance. Everything points to the necessity for further developments along these lines.

THE ECONOMICAL AND THE EDUCATIONAL ASPECT.

But my report is concerned mainly with manual training in its relation to primary and secondary education. As the question has been presented to us in Ontario, it has two aspects—the economic and the educational one, the former being in the minds of most by far the more important. The problem we have now to consider is: What can we do to improve the condition of our industries and at the same time to secure a needed change in our system of education?

As to the economic aspect, in order that my report should deal with facts, so far as I could ascertain them, I requested the high school principals in the manufacturing and other centres of population to investigate the situation in their localities. I have received answers from about forty-five. In many cases definite numbers were not given; but enough was given to show the situation. In the case of Ottawa and Toronto, owing to their population and the variety and number of the manufacturing establishments, I have been unable to obtain any definite particulars, but I have obtained enough to justify me in concluding that the conditions there are largely the same.

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The general conclusions I draw from the answers are as follows :—

1. Under present circumstances, extremely few High School pupils from any of the forms—not, I believe, 5 per cent. of the total attendance—enter the manufacturing establishments in any other capacity than that of clerks or office hands

2. Of those that enter from the Public Schools, and they are quite numerous in the manufacturing centres, with few exceptions they go from the fourth form, and in many—most, I fear—of the localities outside of the largest centres they leave school before they have completed the studies of the form. Such pupils are often reported as remaining at school only until they are old enough to begin work. The following illustrates the situation: In Hamilton, four left the Collegiate Institute last year for the factories; 140, the public schools (not including those from the separate schools); in Toronto Junction, of those now in the factories, 19 are from the high school and 129 from the public schools; and in Lindsay 90 per cent. of all the hands have come from the public schools, the remaining 10 per cent. being about equally divided between old countrymen, and Canadians who have had a short course at the Collegiate Institutes.

3. Manufacturers generally, having in view, of course, the industrial aspect of the question, favour the introduction of manual training into the public and high schools. Some of them hold that we shall then retain the pupils longer in our schools, and thus supply a better educated and more useful class of workmen. Many complain of the lack of education and trained intelligence of the boys and girls that come to them. We have provided in our high schools for the preliminary training of professional men, and we undertake in our bookkeeping, our stenography, and our typewriting, to prepare boys and girls for the merchant's office. The latter provision is, of course, technical. To be consistent, they hold we should recognize the industrial occupations as well, especially in view of our enormous natural resources and the increasing importance of our manufactures. In order to show their appreciation and zeal, some of the manufacturers are prepared to give the preference in employment to those pupils who have had this kind of training

OPINIONS OF ONTARIO PRINCIPALS.

I quote a few passages from some of the answers I received, which show the general situation.

"The manufacturers seemed to think well of manual training, one furniture man saying that a course of wood-working would keep away from him some that can never learn his trade. Another in the same line said that the boys he employs are in many cases hampered by their imperfect knowledge of fractions. As the boys are usually about fourteen when taken on, the question arose why did they not know fractions? The answer was that they had left school years before and had been hanging about home. Mr. Cairnes said that in cutting out gloves what he mainly wanted was intelligence, showing me how a former pupil of mine cut 785 sq. in. of gloves out of a skin which was reckoned enough for 752 inches, while a bad or rather a stupid hand got 44 inches less than had been expected out of a somewhat larger skin.

Few of the manufacturers seemed to have any idea to what extent they employed Public or High School pupils. Many workmen here are Germans or Poles who came grown up. Largely, boys are set to tend machines.

As said before, manufacturers favor manual training, and drawing to scale. The Public School principal thinks that the time could be spared if the Entrance Examination with its excessive memorizing, were done away with. To me it seems a question turning mainly on the readiness of the Provincial Government to pay expenses. High School boards are hard enough put to it already for funds."—*Prin., Berlin High School.*

"About 30 per cent. of the boys who enter the High School, attend about one or two years and then find employment in the factories of the town.

A considerable number of boys from the Public School never enter the High School but find employment in the factories. These boys either run machines or act as assistants to men who run the machines.

About 20 per cent. of the boys from the Public School never even enter the senior fourth class. After discussing the question with our manufacturers, the principal of the Public School, and some members of our Board of Education, I do not hesitate to say that manual training in our Public or High School is quite practicable and desirable. If some of the subjects now on the school course, which are of no *practical* value to these boys, could be dropped and manual labor substituted in their stead, I think we would be able to hold many of these boys and girls one or two years longer at school. This in itself would be worth much to them. If this change in our school course could be effected, the large number of unskilled laborers which we now have, would be replaced, in time, by intelligent master workmen who would have a 'why for every how.'"—*Prin, Gananoque High School.*

"All of the proprietors thought that manual training should be taught in the schools, so that boys might, at an early age, say at 13, begin to acquire skill and knowledge of tools and machinery. After such a preliminary training they could more intelligently decide what calling or department of work to follow. A course of this kind would also keep the boys longer in school, and their literary training might go on simultaneously with the mechanical drills.

Mechanical drawing was warmly advocated."—*Prin., Chatham Collegiate Institute.*

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"I have had many requests from boys just entering the Collegiates to be allowed to dispense with some of the obligatory subjects and take electricity and some chemistry, but on account of the regulations I could not allow that. I sometimes think that when a boy enters the C. I. and has only a short time to remain, and knows that he is going into some electrical works, he should be allowed to take a course that would more directly fit him for the object he has in view."—*Prin., Guelph Collegiate Institute.*

"A school for manual training would be popular in Galt and would be well attended. Parents would be able to find out whether a child has any liking or aptitude for a trade, and manufacturers say that such apprentices would be more intelligent and would not waste so much material. No greater boon could be given to this district. It is only a question of funds.

The question of opening a school for the teaching of Domestic Science in Galt is to be discussed within a few days by a joint committee from the Collegiate Institute Board and the Public School Board."—*Prin., Galt Collegiate Institute.*

"The boys from the High Schools rarely learn a trade. The employers say they often come from the street, having driven wagons, etc., after leaving the Public Schools. I believe working in wood, metal, with drawing, eminently practicable; moulding is of less value. All the great employers, as Leonards, McCleary's, Yates of London Tool Co., are enthusiastic about the matter. They would give the positions to boys who had taken the course in preference to others. They are very desirous of obtaining a more intelligent class of apprentices. There is a strong feeling among the manufacturers in favor of Manual Training. They think it should be in connection with High Schools, as boys should begin about 12 years of age. London is largely a factory town, and our High School is doing very little for those entering into trades."—*Prin., London Collegiate Institute.*

"The manager of the Sylvester works is very strongly in favor of having manual training in the Public Schools. He thinks it could be begun in a simple way and gradually lead to more difficult work, and that the young mechanics of this country would be worth two or three times their present value if they had some training in school. He says that very few of them will go to Technical Schools after they have left school and have been at a trade for a few years, and that in consequence the ordinary factory hand knows only enough to run his own machine. He thinks this would completely change if manual training were taken up in the Public Schools. The Chairman of our Board has given some thought to this phase of education and thinks that the Government should establish for trial in a number of schools in the larger towns manual training as a feature of the Fifth Form work of the Public Schools."—*Prin., Lindsay Collegiate Institute.*

"In answer to your inquiries as to the practicability of introducing a Technical Education course into our schools, we would say that we have greatly realised the need of it. We find that as a rule our apprentices come from the Public Schools, and have no idea at all of the different branches of our trade, viz., cabinet making, carving, finishing and upholstering, and for some time are of little or no value. Consequently their wages are small, and this brings us an inferior class of apprentices. If they had been taught even the first rudiments of their trade, they would be far more valuable to us, and we could afford to pay them higher wages; and this would overcome a great drawback in developing our manufacturing industries. Such a course in our schools would no doubt bring to light great abilities in mechanical lines now lying dormant."—*Letter to Prin. C. I., Ingersoll, from the Ellis Manufacturing Co.*

"The apprenticeship system has almost passed away and manufacturers find it harder to secure boys for shop work than formerly, though there is no lack of boys who wish to take up office work. Several gentlemen assured me that boys with a good English education such as a High School gives, could earn more and advance more rapidly in the shops than in the office. Indeed, one gentleman, who employs between 400 and 500 men, told me that all his foremen are Americans.

There is general feeling among the manufacturers I visited, and the Public School authorities I saw, that a course of Manual Training in the schools would be productive of much good, in turning the attention of boys away from the professions and directing them to the manufactures, where, it is stated, most of the prizes now lie. Most of them emphasized the value of a sound English education, coupled with a knowledge of the uses of tools, and the ability to apply that knowledge in practice. All thought the High School the place to give Manual Training, as the Public School pupil is too immature to profit by it. That a course in Manual Training would attract pupils to the High School, I have no doubt. That such a course could be added to the present curriculum, I have no doubt. The chief difficulty in establishing such a course would be in inducing Boards to spend the money necessary to put up the requisite buildings and equip them properly."—*Prin., Woodstock Collegiate Institute.*

"I have consulted with the superintendents of the various manufacturing works as to the education and knowledge that a boy should have in order that he may become an expert workman. The answers are briefly summarized in this way: In constructive works, apprentices should have ability to perform the simple operations of arithmetic with quickness and accuracy; they should also have command of algebra, trigonometry and geometry as they are applied in the practice of mechanical and physical work, and should know thoroughly the physics of machinery, and mechanics. Mechanical drawing, inclusive of free-hand, is also a necessity. A knowledge of tools, their adjustment and uses, such as comes from practice with them, and an acquaintance with common machines, their method of working, their driving, gearing and adjustment will prove of great service to the boy, and will be a means of hastening his promotion to positions more lucrative both to him and to his employers.

In the textile works, the remarks about machinery and tools also apply, but the mathematics are not so important unless the boy wishes to learn the machine shop practice which is now a part of most large factories, in order that he may be able to repair or alter pieces that require such attention."—*Prin., Kingston Collegiate Institute.*

"The one great complaint I found among the manufacturers and master mechanics was the need of better educated boys to learn the trades. Mr. Patterson, Superintendent of the G.T.R. shops, showed me a package of answer papers he had examined, and, though the candidates were over 15 years of age, their

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attainments were of a low grade. In every case the employers complained almost bitterly of this lack on the part of their apprentices. I was told of a boy who had difficulty in writing his own name. In another case the employer found that one of his men—a comparatively young man—could not read. In many instances, boys are found who read and write with much difficulty.

"Whether the conditions will be found the same in other centres as they are here I am not prepared to say, but it is a deplorable fact that boys should begin their life-work so poorly equipped as I find them. There can be no doubt that parents who intend their boys to become mechanics, and as a consequence the boys themselves, place very little value on a fairly good education. The argument is urged: 'My son is to be a mechanic; of what advantage will it be to him to get more than the merest elements of an education?' To assist in remedying this state of things seems to me to be the prime duty of our secondary schools; to recognize in our system the need of preliminary training for those boys who are looking to the trades for an occupation; to increase the intelligence of the mechanic by keeping boys who are to become blacksmiths, carpenters, &c., longer at school than they remain at present; and to give them considerable scientific and some practical acquaintance with the subjects to which they are to devote themselves."—*Prin., Stratford Collegiate Institute.*

I submit also the opinion of one of our ablest and most experienced Principals: he sounds a note of alarm that deserves attention:—

"In the lower grades of the P.S., where both girls and boys do the same work, paper work, drawing, carving, I suppose it could be done here as well as in Toronto. After that, when boys and girls have to be separated, the difficulty is the expense. A new room for each would have to be built, and a teacher of carpentry, and a teacher of domestic science engaged. It seems to me the same difficulty would present itself in the High School. There is not a vacant room in either High or Public Schools. In fact, the trustees may have to build new rooms for Public School accommodation this year. Many grumble at the expense of the schools now. I am sure the addition of manual training such as will be of any real use, will largely add to the burden. There is no doubt it can be done, if people will stand the expense.

I may be wrong—I have never seen manual training or domestic science taught—but it does seem to me the world is demanding more and more of the teacher every day. Where do the parents come in? Have they no responsibilities any more. What are the mothers of the land doing if they cannot teach their little daughters sewing, cooking, &c.? Do fathers no more teach their boys to make little articles? It seems to me the age is an age of *babies* that have to be *taught everything*. Cannot they do anything themselves? Is the whole responsibility to be thrown on the teachers? We are to teach them religion, so say the preachers; teach them to cook, sew, scrub, iron, &c., say Mrs. Hoodless and her followers; if a Toronto judge finds a bad boy, the teachers are not doing their duty, &c. Where does the parent come in?

Another difficulty is the different employments carried on in our towns. In Germany and England and some of the cities of the United States the whole population is employed at one trade, glove making, shoes, weaving, &c. It is an easy matter to furnish training for one particular trade, but what can technical training do in a town like this?

In industrial schools manual training is excellent and indispensable; in large centres of population both manual training and and technical schools are possible, but I fear not in our small towns."

As to the educational aspect generally: Most of the High School Masters and the Public School Inspectors and other educationalists in Ontario with whom I have corresponded or discussed the subject, are in favor of giving domestic art and manual training a place in our school course, provided always that the obstacles which I will discuss further on—the initial cost, the lack and cost of teachers, want of accommodations, the already crowded curriculum, examination pressure—can be satisfactorily overcome. There are, of course, some educationalists and others so imbued with the spirit of the old humanities, that they can see no value in this training. Some, not without reason, dread the taint of commercialism and the impairment of our present system. Others again, sometimes through thoughtless prejudice and often through self-interest, deride the whole subject. We may hope, I trust, that there will be no just ground for the fears of the former. As to the latter, like the poor, they are always with us.

RECOMMENDATIONS.

In view of the situation in this province I have to recommend:—

(1) That, for educational purposes, manual training, including instruction in domestic science and art, be placed on a par with the other subjects on the programme of both the high and the public schools. These subjects should, of course be optional; for it will be many years before public opinion and our resources will justify the action of Massachusetts with its obligatory law. Here I should say that, in the large majority of schools, the only available form of manual training will be drawing; and, as I will point out further on, the course in this subject should be enriched and amplified, to develop more fully the aesthetic sense and to meet our economic requirements.

(2) That, for economic purposes:

(*a*) A system of evening classes for artisans and others be organized and put in an effective condition. For the actual mechanic, this provision would always be an important one.

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(*b*) That provision be made in our high school regulations for extending the educational manual training into courses of a technical or semi-technical nature, forming departments in our existing schools, but taken, when possible, in separate high schools. And all such provision should be of flexible character, so that, as the character of our cities and towns becomes differentiated from year to year, school boards may adapt the details to local conditions; but no such provision should fail to recognize the paramount importance of a good academic education in English, Science and Mathematics.

An important proviso I must add—and in view of my experience and of my knowledge of the situation I cannot emphasize it too strongly—*the Education Department should sanction no provision for manual or technical training of any kind at the expense, even at first, of our existing courses.* Notwithstanding all that can be said in behalf of the practical, the claims of the academic must always be paramount.

The German system of education, as we have seen, draws a sharp line of demarcation between general and technical education, and, consequently approaches closely to what an ideal system should be. The better the division of labor, the better the product. But Ontario is not a wealthy and populous community, and in many respects she resembles the United States more closely than she does the German Confederation. The American system, which connects the educational manual training of the elementary classes with the technical training of the High School is within our reach and likely to suit our conditions.

A few words as to the order of urgency. As is shown by the answers I received from High School Principals, even from the utilitarian point of view it is the Public Schools that should first and chiefly engage the attention of the Education Department. This is the source whence come most of those who enter the manufactories. The supply often produces the demand, and the High School also deserves attention; but it is to the Public School, for some years at any rate, that we must look for most of our artisans. Every educational consideration also enforces this view. Psychology tells us that it is when the child is in the formative stage—when he is in the elementary school—that the development of all the motor centres of the brain should be begun.

But we cannot expect much at first and it would be most unwise to force the pace of public opinion. The new subjects were introduced into the United States nearly a quarter of a century ago, and, though good progress has been made, what has been done is meagre compared with what remains to do. In Ontario all we can expect for some years is sewing in most of our Public Schools, and cooking in the cities and towns; both being continued in some of the High schools. Manual training we may have, sometimes of a simple character, in our city and town Public and High schools, with technical extensions in a dozen or so of our largest High schools and Collegiate Institutes. A separate Technical school I do not believe feasible at present in any other place than Toronto. In its Technical school, now for evening classes only—we have the potentiality of a first rate institution. With a wing added for more teaching class rooms, "shops," and an assembly hall, a completed equipment, and effective staff, and one or two additions to its courses, we should have at a cost easily within the capabilities of the municipality, a technical day school inferior to few in the United States. The city cannot long ignore the need of such an institution or the inexpediency of maintaining its costly building and equipment for evening classes alone. The much needed reorganization of the Toronto school system would also most surely follow the establishment of such a school.

The proposal occasionally made to turn some of our High schools into Technical schools is one which, I think, cannot be entertained. Technical education is needed chiefly in the larger centres, and in them as well as in the smaller ones, what the public value most is a general education and courses for business, for the professions, and for teachers' certificates. As I have already said, we should have a separate Technical school in Toronto. In all the other cities, undifferentiated High schools are maintained. Specialization such as we find in the States, has not yet set in. Nor would any of the smaller centres be willing to have the programmes of their present High schools curtailed. The work done by some of the smaller schools hardly justifies the expenditure upon them; and yet, during the past twenty years, only one locality has given up its High school. For a system of Technical education we must for years look to some such scheme as I have proposed.

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The question of the Trade school we may disregard for the present. Its maintenance by the Legislature, either in whole or in part, cannot now be a question of practical politics. Indeed, only in Toronto, could such schools be possible. Elsewhere, in the smaller cities and towns, our manufactures have not yet become specialized as they are in England, Germany, and some parts of the United States. Trade schools in our smaller centres would be an impossibility. When, owing to increased resources and the development of our manufactures, this problem presents itself, private enterprise in Toronto, as well as in the States, has already shown us one way in which it may be partly solved. Besides, every year the question becomes of less importance. Every year sees a greater specialization of machinery. Even now a boy can operate a machine which does the work formerly done by over a hundred men; and the artisan of the future will be best equipped if he begins his work after his intelligence has been developed by Manual Training, and above all by the ordinary academic courses Capability and adaptability will be worth more than the mere skill of the expert.

THE OBSTACLES.

But, as the answers I received from Principals show and my own experience as Inspector leads me to believe, there are very serious obstacles in the way of the introduction of Manual Training into our school system. Apart from difficulties arising out of our present organization, which I will discuss in the second part of my report, and which I may say, are, I believe, not insurmountable, there are two main obstacles—the cost and the want of competent teachers.

(1). As to the cost. For sewing all that is needed is competent teachers; but, for cooking and manual training in wood and iron, special equipment and separate accommodation are needed as well. As to the equipment: I submit a conservative estimate of the cost of a room filled up in good style for a class of twenty in cooking: this number, Miss Norris, the Principal of the Toronto Victor School, to whom I am indebted for the estimate, regards as the largest a teacher can manage efficiently at one time:

20 desks, each fitted with full length drawer and stand; $6.00 each (set up)	$120 00
20 stools with rubber tips, 60c. each	12 00
1 dish and utensil cupboard, 7 feet 6 inches long and 7 feet high, with seven drawers, 5 sections, shelved	40 00
Utensils and dishes	75 00
1 Range with warming closets	35 00
1 sink iron enamelled with back	15 50
2 sink tables, $4.00 each	8 00
Linen for towels	10 00
	$315 50

Cupboards to be ash; desk and tables, ash body, birch top; bunsen burners and a number of minor necessities are omitted. Refrigerator not included. No provision for children's aprons are mentioned, as such provision may or may not be needed.

In a good many cooking schools I visited, there were several ranges—one for coal; one for gas; and, occasionally, one for electricity; the object, of course, being to accustom the pupils to the different kinds.

For the following statement of the cost of a "shop" for wood-working, I am indebted to the official report of the Kingston C. I.: it includes the cost of the drawing department:

18 Drawing Tables at $4.25	$ 76 50
36 Drawing Boards at 60c	21 60
18 Sets Drawing Instruments at $8.75	157 50
Miscellaneous Drawing Instruments for demonstration and occasional use	53 00
18 Wood working benches, with quick acting vise, at $17.25	310 50
18 Sets bench tools for students use at $11.14	200 52
Miscellaneous wood working tools for demonstration and occasional use	53 00
Fitting up the workshop	140 00
	$1,012 62

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For High Schools that would attempt courses in hot and cold metal, as well as in wood, the cost would be much larger. What it would be, even in a modest way, may be gathered from the following statement of the value of the building and equipment of the department in Woodstock, which provides for two classes of 24 each in wood and one class of 10 in iron work :

Building, brick 2½ storeys 30x80 feet	$2,500
24 Carpenters' Benches at $12.50	300
24 sets of tools at $15.00	360
24 Wood Lathes at $30	720
Shafting, Belting, etc	650
Wood carving Benches for 24	120
24 Sets Carving Tools	100
Special Tools for occasional use	150
Wood Working Machinery (Planer, Circ. Saw, Scroll Saw. etc.)	400
10 horse power Gas Engine	750
Blacksmithing outfit for 10	300
Machine Shop Tools for Iron Work	2,500
Small Tools for Machine Shop	200
	$9,050

For the following particulars I am indebted to Prof. Robertson, of Ottawa, who has charge of the Macdonald Manual Training fund: the statement gives the cost of fitting up one of the manual training rooms.

The Manual Training equipment, benches and tools, for a 20 bench centre would cost, at prices we have been paying, about $400.00. The fitting of the room with cupboards, general tool racks, etc., would cost about $300.00, per room. Sometimes that cost of $300.00 per room has been exceeded when it has included the cleaning up and painting of the room.

One teacher can take charge of a single 20 bench centre suitable for twenty boys. Taking twenty different boys every half-day permits the centre to deal with two hundred boys per week.

The following is the list of tools that have been provided :

FOR THE ROOM.

5 Smooth Planes.
3 Fore Planes.
8 Round Head Mallets.
1 Draw Knife.
1 Mitre Box.
2 Try Squares.
4 File Cards.
8 Screw Drivers, small.
2 Screw Drivers, large.
1 "T" Square, each 4 in. and 5 in.
8 Flat Files, 8 in.
8 One-half Round Files, 3 in.
2 S.T. Files, 4 in., and one handle.
2 Flat Files and one handle.
4 Bit Braces.
5 Bevels
5 Nail Sets.
8 Wood Spoke Shaves.
4 Hand Screws.
10 Brad Awls, assorted handles.
2 Doz. Brad Awls, not handled.
2 Slips for Gouges.
8 Scrapers.
4 Mort. Gouges.
4 Wing Dividers, 5 in.
4 Pincers.
1 Cutting Plyer, 5 in.
1 Flat Plyer, 5 in.
1 Round Plyer.
2 Oil Cans.
2 Centre Bits, each ¼, ⅜, ½, ⅝, ¾, ⅞, 1, 1¼.
1 Auger Bit, each 3/16, ¼, ⅜, ½, ⅝ and ¾.
4 Drill Bits.
2 Screw Driver Bits.
2 Wood Counter-Sinks.
1 Iron Counter-Sink.
5 Oil Stones.
1 Rabbet Plane.
10 Hammers.
2 Firmer Gouges, each ½, ⅝, bev. inside.
2 Firmer Gouges, each ⅝, 1, 1¼.
2 Mortice Chisels, each ¼ and ⅜.
2 Chisels, 1/16.
4 Firmer Chisels, ⅛.
2 Hatchets.
1 Pad Saw.
1 Grind Stone.
4 Rip Saws and 4 Cross Cut Saws.
6 S.P. Corks.
2 Spg. Dividers.
3 Cutting Guoges.
5 Gimlets.
1 Tool Grinder.
2 Bent Gouges, 15 each ⅝ and 1.
2 Blackboard Compasses.

FOR THE BENCH.

1 Rule.
1 Drawing Rule.
1 Sloyd Knife.
1 Guage.
1 Try Square.
1 Jack Plane.
1 Firmer Chisel, each ¼, ½, 1.
1 Bench Hook.
1 Pencil Compass.
1 Back Saw.
1 Marking Awl.
1 Drawing Kit.
1 Brush and Hook.

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Under the MacDonald system, I may say here, the boys have one session each a week, lasting the whole forenoon or afternoon, the girls of the corresponding classes in Brockville during these periods taking under the regular teachers, sewing, knitting, and cutting out, and listening to talks on Domestic Science. In the opinion of Mr. Robert Meade, P. S. I. of Brockville, from whom I have learned these particulars, the sessions are too long and much better results would be obtained if each pupil had two, each 1½ hours long. By the present plan, the pupil is completely tired out bodily and mentally. Besides, the sessions are so far apart that he has forgotten much of his previous lesson and his interest in his last piece of work has been gradually fading away. In Mr. Meade's estimation, the "Centre" system is to blame for this. In the elementary schools I saw in the United States, the time given to Manual Training varied from an hour once a fortnight to three hours or four hours and a half a week, the latter provision being regarded as the best one.

Nor, in counting the cost, can we ignore the important fact that very few of our Schools have accommodation to spare, and the equally important fact that the cost of the present system is, in most localities, as great as the taxpayer is prepared to meet, until, at least, this subject is more generally understood. And, further, I can think of almost no High School in Ontario, and this is true, I believe, of the Public Schools as well, which, to do full justice to both the staff and the pupils, does not need additional teaching power for the existing courses. Many of our classes are far too large, and many of our teachers are sadly overworked. We must be prepared to do a good deal more than simply add the new subjects to the programme.

(2). As to the lack of competent teachers. Notwithstanding the provision for training teachers that has been made in the United States, this is still a serious obstacle there, and for some years it will be a very serious obstacle in Ontario. The Hamilton and Toronto Schools of Domestic Art with their Normal classes are fortunately ready to hand. All that is needed is the demand. But, for Manual Training, no similar provision has yet appeared. Kingston had to import a teacher from the United States at a salary which few boards would care to pay, and the MacDonald Schools are manned by teachers from England. True, the latter schools provide instruction for the teachers of the locality, and a summer school was opened last year; but is the product of such classes likely to be satisfactory in view of the fact that the courses in the United States schools take at least one year, and oftener two? This phase of the question is a most important one. All the educationalists I have met are unanimous on this point. Mr. R. M. Smith, Supervisor of Manual Training in Chicago, who has made a special study of this subject, expresses an emphatic opinion. "Manual Training stands or falls with the character of its representative. I should recommend that great care be taken in its introduction, otherwise we shall bring the new branch into disrepute, and, when a thing of this kind is tried in a community with failure as a result, it is very hard to reinstate it in the minds of the people." As to technical evening classes: only in the University centres—Toronto and Kingston—could competent teachers be secured without, as in Germany, drawing upon the staffs of the High Schools or Public Schools. But, as matters stand, it would be unreasonable to expect our teachers to do the work of the evening classes in addition to the work of the day school. To do so would be to sacrifice their own health or the interests of both classes of schools. A special grant to School Boards concerned might overcome the difficulty by enabling them to increase their staffs and thus relieve one or more of part of their day duties.

RECOMMENDATIONS.

In order to assist in overcoming these obstacles, I beg leave to recommend as follows:—

(1) The Education Department should take steps to provide a supply of competent teachers. The expert mechanic as I have already pointed out will not suit. The industrial side of the question is important, but the educational side is more so, and, even for the technical departments, we need the trained teacher. The difficulty may be tided over for a year or so by importing foreign teachers; but we must look to Ontario for a permanent and effective supply. All our teachers must be "to the manner born." From the nature of sewing, it may form part of the course in our Normal Schools, and before long

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in our remodelled Model Schools. As to cooking, it should at first be an optional course in the Hamilton Normal College. The Ontario Normal School of Domestic Science and Art is available. All that is needed is a departmental regulation to set the machinery in motion. In Toronto we have also the Victor School, and, no doubt, before long, facilities of a similar nature will be available in London and Ottawa. These cities cannot lag behind, even if no action is taken in the matter by the Education Department. In this way eventually provision can be made for all the Normal Schools as well, even if the Education Department itself does not act. Under present conditions, a Normal course of four or five months may have an educational value; but it is insufficient preparation for teaching. For a time, the Normal College would, I believe, produce a sufficient supply. As to manual training, for some years, the demand for teachers will be small. If an arrangement were made for the establishment of a Manual Training Department in the Hamilton Normal College (which might also be a city Public School centre), our requirements would be met for some years at any rate.

Provision in our professional courses is an absolute necessity. The first step in Sweden was to make manual training a part of the Normal School courses. There is no State system in the United States; but this was also the recommendation of the Massachusetts State Commission appointed in 1891, "to investigate the existing system of Manual Training and Industrial Education." And, as has been shown, such provision exists in some of the Normal Schools.

(2) In view of the importance of Domestic Science and Art, and of Manual Training with its technical extensions, the Legislature should, for a time, stimulate their introduction by a special grant, proportioned in each case to the magnitude of the undertaking, and limited only by its liberality and a due regard for other departments. The MacDonald Schools are to be maintained for three years. The Legislature of Ontario might fairly give its special grants for that time at least. Afterwards any sum voted should be apportioned on the same bases as is the present legislative grant—on the character of the accommodations, the value of the equipment, the average attendance, and the amount of the salaries paid the special teachers. The percentage at first allowed might be larger than that given under the scheme for distributing the present grant; but it should be gradually reduced as the subjects commended themselves to the people, until Manual Training and Domestic Science and Art are placed where they should be—on the same footing as the other departments of school work. Only special considerations can justify special grants. The utilitarian value of sewing and cooking will, no doubt, commend them before long to most School Boards; but with Manual Training, the case is different. As to the Technical evening classes I have already suggested a special grant.

For all such grants we have a precedent. For some years, under the late Chief Superintendent, when Latin became an optional subject in the High Schools—the remodelled Grammar Schools—Collegiate Institutes were created with a special grant to each of $750, over and above its share of the ordinary High School grant. It was feared that otherwise classical culture in Ontario might decline. Before long, however, this fear was found to be groundless and the special sum voted was then added to the ordinary High School grant. The first step in this direction has been already taken by the Legislature. All that is now needed is an increase of the grant, proportioned to the necessities of the situation.

PART II.—HIGH SCHOOL COURSES OF STUDY.

When discussing the obstacles to the introduction of manual training and domestic art into our schools, I stated that some are the result of our present organization. As a matter of fact the evils that cause these obstacles ought to be dealt with on broader grounds They are of long standing; and, though the influence of some of them is much less than it was over fifteen years ago, we can have no satisfactory system of education in this Province until they have been removed or reduced. Our examinations are so intimately connected with our courses of study that they cannot be discussed separately; nor can certain other considerations which affect both be left out of account. This part of my report will, accordingly, deal with the whole situation so far as it bears upon the work done in our High Schools.

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THE CAUSES OF THE EVILS.

Most of the evils we suffer from may, I believe, in the final analysis, be traced to two main causes:

A. The excessive pressure of examinations and courses;

B. The excessive unification of examinations and courses.

To prevent misapprehension, let me say at the outset that, when the teacher's reputation is established and when he is reasonably secure in his position, he can afford to ignore and he does ignore many of the influences which injure education; and that there are many school boards which consider only the real educational well-being of their schools; but there are few, if any, localities in Ontario where the evils I am about to point out do not exist to a greater or less extent.

THE EXCESSIVE PRESSURE OF EXAMINATIONS AND COURSES.

The case for and against an examination system has been threshed out again and again. It is unnecessary to present it here; but I must deal with the two leading objections; for they are the prominent ones in Ontario:

(1) The prospect of an examination held by outside examiners turns the pupil's and the teacher's attention from the subject to the examination. The subject acquires a significance not belonging to itself, and a wrong ideal of education is set up for the pupil, the teacher, the trustee, and the general public. I was struck with this fact most forcibly last fall. As soon as I crossed the bridge at Niagara, although in a State with a system of examinations (the Regents' Examinations of the University of the State of New York), I found myself in a wholly different educational atmosphere. Nowhere, not even in the State of New York, had I any reason to suspect that examinations by outside authorities exercised any influence. Each school is its own examiner, and I nowhere heard the examination question referred to: I had always to ask about it. The questions discussed there are what is the best kind of education to give and how best shall it be given. In Ontario, on the other hand, I hear more in our schools about examinations than I do about anything else. No part of our system can claim that it is free from this influence—neither the Public School with its form examinations leading up to the departmental High School Entrance and the Leaving examination; nor the High School with its Junior and Senior Leaving examinations in four parts and its Commercial and special Matriculation examinations; nor the Provincial University with its Matriculation and its four Annual examinations, until lately conducted by outside examiners. I am not putting the case too strongly when I say that throughout our system, the examination forms the woof of almost all educational effort.

It is proper, however, to state here that an effective use has been made of this influence for beneficent purposes—to stimulate both the teacher and the pupil and to direct their efforts into proper channels. The stimulation and the general improvement of the teaching are undoubted; but the stimulation and the interference have both been proved to be excessive.

(2) Under an examination system, that counts most on which examination questions can be put. The greater the pressure, the greater the evil. That our examinations do interfere seriously with proper teaching, no one who has any knowledge of our system can doubt.

One or two illustrations may, however, be given. It is impossible to hold an oral examination in the languages at the different centres. The consequence is that, in very many of our schools, little attention is paid to the pronunciation, and in many places, indeed, almost none. I have heard pupils who have been two or three or even four years at French and German, for example, make about as many blunders and read with as little fluency as a pupil who had been at the subject only a few months. And as for Latin and Greek, very seldom does one hear a pupil read with fluency and due regard for quantity. But it is not fair to blame the teacher for this. The pupil takes little or no interest in the subject; it doesn't pay at his examinations; and he looks on it as a matter of minor importance. As for the teacher, the usual explanation of the neglect is that he hasn't the time; he is oppressed with a course in translation, grammar, and composition that must be completed before July.

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Or, to take the case of a whole subject. The regulations prescribe the amount of time to be given each week in a High School to physical culture and reading. No part of my duties has given me more trouble than this For years, in some places, it seemed to be impossible to have this very necessary regulation complied with. Even now it is only in the Collegiate Institutes—and in not all of them—that suitable provision is made for physical training, and I have still occasional difficulty with the reading regulations. If, in the arrangement of the time table, anything has to suffer, it is the reading or the drill. Neither now counts at the examination, and when reading did, it had little importance. In order to give prominence to reading, the High School Inspectors have for years made a point of examining the last class of entrants and the other pupils who take the subject. The statement below gives the results of my own last examination of all the schools in the Province with one or two exceptions. It represents the results of ten years of strenuous effort; and, as will be seen, it still leaves much to be desired. In the entrance classes I have examined on a simple "unseen" passage, and all I have expected from them has been clear articulation and fair intelligence; in the case of the other pupils, I have examined them on the work done in the class, and I have consequently set a higher standard. In a numerical valuation, "good" means 50 per cent. and over, "fair," between 35 and 50 per cent.; "poor," between 25 and 35 per cent, and "bad," below 25 per cent; the last class should have been in the third book:

I. *Last Class of Entrants (1899 and 1900)*

	Collegiate Institutes.	High Schools.	Total.
Good	560	271	1,031
Fair	804	735	1,539
Poor	644	735	1,379
Bad	92	142	234
	2,100	2,083	4,183

II. *Other Pupils.*

	Collegiate Institutes.	High Schools.	Total.
Good	430	388	818
Fair	665	671	1,336
Poor	564	814	1,828
Bad	37	101	138
	1,696	1,974	3,670

In explanation, I must add that in the case of Table I, 16 Collegiate Institutes and 76 High Schools had fewer than 10 in the "good" class, and 3 Collegiate Institutes and 43 High Schools fewer than 5, and in the case of Table II only 21 of the Collegiate Institutes and 8 of the High Schools had 10 and over; and 5 of the Collegiate Institutes and 53 of the High Schools had fewer than 5. Only 25, indeed, of all had a really good record. It is fair to add, however, that, owing to the dates of my visits the above statement unduly favors the entrance classes, many of whom had been six months and over under the High School teacher; and it is unduly unfavorable to the other pupils, many of whom had been less than a year and a half in the High Schools. The statement must be viewed in the light of these facts.

Frequently, too, I have asked the last class of entrants how often they had reading the year before they left the public school. Usually they have had no or almost no practice in oral reading, and in extremely few cases had a proper amount of time been given the subject. All the time had gone for the written examination subjects.

English composition, too, has suffered in the same way. Comparatively few are usually rejected at the departmental examinations in this subject, and partly for this reason and partly owing to the pressure of the other subjects in which the examination standard is higher, the attention generally given to this, in my judgment, the most im-

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portant subject on the programme, is quite incommensurate with its usefulness and its value as culture.

To take an illustration of another kind: To secure the proper study of botany, the most important part of the examination was made practical, and, as all that could be expected from junior candidates was the description and classification of a plant. These were for years the staple subjects of study. Most pupils who have taken Botany in Form I only, have left school with the idea that its chief end is to be able to hunt out the name of a plant in the Flora, and the difficulty of the terminology has made a more lasting impression upon them than anything else. Since the abolition of the examination, far better and far more enjoyable work in botany has been done, notwithstanding the drawbacks of the general situation. The reign of the Flora and the schedule are over.

However admirably our questions may be put—and our questions compare most favorably with those of any other country—the examination destroys the symmetry of our courses by giving an adventitious importance to some parts and detracting from the due importance of others. Besides, there are elements of culture—the highest, indeed—which the examinations cannot reach. We may examine a boy, for example, on the meaning and the literary qualities of one of Tennyson's poems; but no questions can discover whether it has entered into his inner life. The best literature defies every attack of the examiner's scalpel.

The general evils I have been dealing with would exist under any examination system. My experience leads me to believe that there are also other evils indigenous to Ontario. Our system is practically a competitive one amongst schools The initial impetus came from the Intermediate over twenty years ago, when the legislative grant was distributed on its results. During this period there was a fierce scramble for pupils, for a large annual grist meant more money to a school. After a time the grant was distributed on another basis; but the evils of the former system did not disappear. On the contrary they were kept alive and reinforced by the continued prominence given the examinations. The annual publication of the results in the Toronto dailies with the ensuing local comments and comparisons based thereon, have much to answer for. Unfortunately, the feature of our schools which should be kept in the back ground has been exploited and the consequences have been serious. Some of them I must point out:

(1) Boards of Trustees and the general public have been educated to regard a large attendance and success at the examinations as *the* proof of the teacher's competency and the school's efficiency. For years, in many localities, the attendance was congested, being swollen by numbers attracted by the examination successes. Boards were put to expense to maintain establishments which their necessities did not justify and for which the localities themselves got no adequate return. Of late years the situation has improved; for, owing to the general progress of the schools, candidates are seldom compelled to leave their own counties. But the evil still exists everywhere to a greater or less extent. Boards still attach special importance to a large attendance.

Frequently, too, when, owing to an excessive attendance I have had to report that an addition to the staff was absolutely indispensable if justice was to be done to all concerned, I have been confronted with the examination record. The Greek pedant, when he wanted to sell his house, carried around with him a specimen brick to show to possible purchasers. He yet lives and walks this Province in modern guise. It is by no means uncommon either for Boards to require and teachers to present an analysis of the examination results, showing how many have failed in the subjects taught by each member of the staff. At the present moment, indeed, I have such a statement before me, prepared on last year's results, to show a Board the relative merits of the different teachers and sent to me for a similar purpose. Even if the examination were what it most emphatically is not—the most reliable test of the teacher's efficiency, the moral aspect of the whole affair is most objectionable. Success at an examination year after year is *a* proof, not *the* proof, of a teacher's efficiency. The success is due at least as much to the character of the attendance as it is to the competency of the teacher. No sane man would base a claim for the superiority of the Collegiate Institutes of Toronto, for example, on the ground that the number of examination successes scored by them is larger than those by schools in the other cities of the Province. Besides, there are moral elements, which the examination is powerless to test in education and in comparison with which the petty triumphs of the examinations are utterly insignificant.

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(2) Many High Schools attempt more courses than their staffs can undertake with justice to all concerned. I have visited some with only two teachers in which the work of all the forms was attempted, with almost all the options; and there are few, if any, of the schools that do no suffer in this way. This means, of course, work after hours for both teacher and pupil, not to speak of the necessary neglect of the junior classes and of the individual pupil. Nor is this evil confined to the High Schools. I am, indeed, much mistaken if the teacher of the Continuation Class, with his candidates for the High School Entrance and the Public School Leaving, and, it may be, for the Junior Leaving, could not also "a tale unfold."

(3) The desire to stand well at the examinations has led to too much teaching and to too little independent effort on the part of the pupil. The latter does not believe that full justice is being done him unless he is in class all the time, and the teacher feels uncomfortable unless he is. The pupil too often resorts to the teacher for the solution of his difficulties when he should solve them himself; and the teacher, against his better judgment, often succumbs to the exigencies of the situation. Besides, the situation is sometimes such that he cannot resist. I have known teachers to be looked upon as inefficient for reasons that actually demonstrated their efficiency. This emphasis of the examination has brought with it a train of other evils—a reduction of the length of class periods, too rapid advancement in the forms, too great reliance upon the text-book, the so-called "School Helps," over-annotated text-books, the too general use of "cribs," too hurried preparation, a distaste for study and so on. "Storm and stress" are inconsistent with culture. With Milton, we should aim at "beholding the bright countenance of truth in the quiet and still air of delightful studies."

(4) The examination pressure is increased by the pressure of the subjects—by what is often called the "multiplicity" of subjects. As usually understood, this means that there are too many subjects in our School curriculum. And yet, there are few, if any, that our critics would agree to omit. It is far easier to name subjects which modern conditions would justify us in inserting than to name those which can be fairly left off. But there is a sense in which the objection has force. The options are numerous, and the programme for some of the forms might fairly be reduced. The difficulties of the situation are, however, due not so much to the excessive number of subjects in the forms, as to the examination pressure on all or nearly all of them. Some of minor importance are magnified out of all proportion to the educational value. With the examinations in view the teacher has to keep all of them going. His own zeal and the pupil's anxiety practically force him.

(5) About twenty-five years ago, the legislative grant was apportioned on the attendance in Latin. The result was that almost every pupil was put into Latin. Although the cause is different, the present situation is practically the same. Very many pupils on entering do not know what their future occupation will be, or how long they will remain at the High School. As Latin is obligatory for Matriculation, and for the Leaving examinations, and as, with few exceptions, all take these examinations who reach the stage, the teacher naturally enough advises such pupils to take Latin. But many of them for various reasons, drop out of School after a year or so.

Many again have at first great plans and take up all the examination subjects, but drop Latin when difficulties begin to develop. When, too, some who enter intending to remain only a short time, in the end take a complete course, it is easy to see how embarrassing the teacher's position is. With his organization in view, he very properly desires all pupils who may need Latin to take it in Form I. As French, German, and Greek are also options for the Leaving examination, the languages have thus assumed an adventitious importance. The following tables bear out my contention. Table I. shows the number taking the languages, and Table II. the number reaching the examination stages, with the total and the form attendance. Table I. shows a falling off in attendance in Forms I. and II., especially in Form I., due, I may say, to the Continuation Classes. Many pupils now remain in the Public Schools for a year or so after passing the High School Entrance examination. This, of course, intensifies the evil in the High School; for they come either, knowing no Latin or having learned it badly. As a result, the organization of the Form II. and Form III. Latin classes is, in many schools, very defective for a good part of the year.

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I. *Statement of the attendance, 1890-1900*

Year.	Total.	Form I.	Form II.	Form III.	Form IV.	Latin.	Greek.	French.	German.
1899..	22,460	8,407	6,912	5,701	1,440	19,131	1,176	13,464	5,513
1898..	23,301	9,867	7,101	5,300	1,583	19,313	1,456	13,866	6,268
1897..	24,390	10,186	7,262	5,363	1,629	16,873	1,421	13,761	5,169
1896..	24,567	10,191	7,466	5,232	1,678	15,526	1,458	13,374	4,503
1895..	24,662	9,742	7,822	5,535	1,563	12,587	1,419	11,866	3,464
1894..	23,523	8,852	8,313	4,900	1,458	9,366	1,080	10,530	2,785
1893..	23,035	9,274	8,071	4,435	1,275	8,918	1,008	10,482	2,854
1892..	22,837	10,820	7,607	3,370	1,040	9,906	1,070	10,398	2,796
1891..	22,230	17,348	3,883	946	53	8,488	1,087	9,319	2,811
1890..	19,395	14,950	3,588	772	85	7,114	1,071	7,837	2,212

II. *Statement of the Examination Results*

—	*Second Class.*		*First Class.*	
	No. of Candidates.	Passed.	No. of Candidates.	Passed.
1889	1,427	745	248	91
1890	1,518	959	188	109
1891	1,710	1,008	248	134
1892	1,701	807	343	155
1893	1,723	909	591	145
1894	2,198	1,107	637	175
1895	2,615	1,147	540	302
1896	3,260	1,725	691	312

—	*Junior Leaving.*		*Senior Leaving.*			
	No. of Candidates.	Passed.	No. of Candidates.	Passed. Full Form IV.	Passed. Part I. Form IV.	Passed. Part II. Form IV.
1897	3,000	1,920	977	354	155	148
1898	2,373	1,147	704	83	106	75
1899	2,479	1,344	774	147	219	89
1900	2,224	1,506	834	....	436	408

In 1900 when a candidate took the whole Senior Leaving, and was successful, two certificates, viz., one for each Part, were issued in each case. Of course, many took only one of the parts.

Latin became obligatory in 1896, but as the former regulations remained in force the full effect has not yet been apparent. It is only in 1899, when, indeed about 50 still wrote under them, that we can form a proper idea of what it will be. Before 1896 Latin was an option; French and German have always been options, and Greek has been one for many years. Further on I will deal with this subject again; but, without going into details, I wish to point out here that, whereas in 1890, out of a total attendance of 19,395, only 7,114 were in Latin (then an option), in 1899 the number in Latin rose to 19,131 out of a total of 22,460. In view of the educational necessities of this Province and the fact, shewn by Table II., (adding about 100 for those who took the honor and scholarship examinations) that, of those who begin High School work, only about 16 per cent. reach the very humble standard of the Junior Leaving, no one surely will justify the present situation.

But the educational side of this question is not the only one to consider. In some places the High Schools are not so popular as they should be. Strong objection is taken

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to pupils being put into Latin. This objection is, I believe, one cause of the antagonism which the High School sometimes encounters. The situation is the result of the obligatory Latin, and the Education Department gets the blame.

THE EXCESSIVE UNIFICATION OF COURSES AND EXAMINATIONS.

The dominating courses and examinations have been those for University Matriculation. The University authorities are, nevertheless, dissatisfied; and, as a result of the assimilation, other important interests have suffered.

In this connection it will be well to state generally what the situation is. A good many years ago, educationalists held that the training of the mind should be the only consideration in constructing a curriculum. At one time, indeed, not even book-keeping had a place on our High School programme. This theory few now hold. The necessity for recognizing the practical soon forced itself into prominence. Discussing this subject, Huxley expresses himself thus in one of his addresses: "If a man has to sharpen his teeth, he had better do it on good bread and cheese than on shorts." There is no reason, indeed, why we should not secure both culture and the practical in our schemes of primary and secondary education. This being conceded, our High School courses would have the following in view:

(1) General culture, (2) commerce, (3) agriculture, (4) the industries (5) university matriculation, (6) preliminary professional examinations, (7) teachers' non-professional examinations.

Ample—some think, too ample—provision has been made for university matriculation and the preliminary professional examinations. As these courses have been unified and have been the Procrustean bed on which most of the others have been stretched, they have comparatively few defects. But in the pressure of assimilation to the matriculation courses, the interests of the public schools have suffered. For the industries and for the development of the creative faculties, as I have shown in part II., practically no provision has yet been made. For commercial pursuits, on the other hand, the provision is ample—too ample, indeed—for, as bookkeeping is an obligatory subject, many are forced to take it for whom a year's course is comparatively valueless. In a month or so—in connection with arithmetic, it may be,—the ordinary pupil can acquire all the knowledge of commercial transactions he will ever need. Agriculture has a place on our programme; but I know of only one high school in which it has been taken up, and then only in winter for half an hour or so a week. The regulation making the provision is a dead letter. Besides, the courses in physics, chemistry and biology are the university courses; they have no relation to agriculture, nor have they any other practical application. A general course is recognized in our scheme, but it has been squeezed out by the others and by the examinations. Many people, I find, do not even know of its existence. This course is also, to some extent, a part of the unified scheme, and is controlled by the same considerations.

(2) We have two sets of examinations, (*a*) the junior and the senior leaving (including matriculation), the preliminary professional examinations, and the examinations for teachers' certificates—all more or less unified; and (*b*) the commercial diploma examination, part I. of which is unified with part of the junior leaving. This unification has been attended with evils. Under it, the examiners, it is well known, have always experienced great difficulty when they have attempted to recognize the claims of the different interests involved. At the junior leaving, in particular, circumstances, for a time, led them to consider chiefly the interests of the teachers, to the disadvantage, it is held, of the matriculant. Of late, however, the interests of the matriculant have been dominant, to the undoubted disadvantage of the teaching profession. Until lately, too, the pass per centage for all candidates was the same; and although the teacher has now to make a percentage of the total, his preparation is still too meagre for his duties. Even supposing that the same courses and the same grade of question were suitable for all who take the junior leaving, the allowance that should be made for the matriculant should not be made for the teacher. The matriculant should be required to show simply that he is able to go on with his undergraduate work. Being young he is mentally immature, and he should have the benefit of every doubt. It is different with the teacher: he should at least show that he knows the subjects of the public school courses well enough to teach

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them. He should be older and more mature, and the public interests do not justify extending to him the same consideration as to the matriculant. In the matter of the commercial diploma also, the requirements of different places are different. The standard and the courses that suit the larger city are often unsuitable for the village or country town.

The High School Entrance examination affords us another example of the effects of the unification idea. Instituted at first solely to test the competency of the pupil to begin his work in the High school, it has gradually become an examination for testing the efficiency of the Public schools, and it is even yet used as a final examination for pupils of a lower grade than those who take the regular Public School Leaving examinations. Experience has, I believe, demonstrated the fact that it has suited neither class of candidate. Subjects are prescribed for the entrant and emphasized by the examination that are unimportant for his subsequent courses; and the examination standard has usually been too high for him and too low for the Public School Leaving candidate.

Proposed Amendments.

I have now pointed out what seem to me to be the leading general defects of our present organization. Before suggesting amendments, I desire to express my conviction that, notwithstanding the serious defects which have grown out of the excessive pressure and unification of courses and examinations, we owe the wonderful growth of our High school system more to them than to almost any other cause. No one who knows the condition of our schools twenty years ago can doubt this. Then the professions and the universities held each its own matriculation examination with, in most cases, different requirements, all again differing from those for teachers' certificates. Under these conditions there could be no proper economy of the teaching force, and effective organization was an impossibility. The examination system has done still more. It has provided a stimulus which, under the resulting competition amongst the High schools, has forced Boards to provide better and better paid teachers, better equipment, and, to some extent, better accommodations. It has improved the character of the teaching in both the Public and the High Schools, stimulated both pupils and teachers to greater diligence and zeal; and, while it has put more responsibility on the teacher, it has aided him in his discipline by providing his pupils with an incentive to study. No more effective means could have been devised to remove the grave and far reaching evils which existed before the Intermediate was established. But, as with everything else in this present evil world, the evil is mingled with the good. Unification has been carried too far, and the pressure has proved to be excessive. But few would advocate the complete abolition of our departmental examinations or the segregation of our courses of study. So far as my knowledge goes, neither the teachers nor the general public, as a body, desire such a change. While they recognize the defects of our examination system, they have realized its advantages. It must be remembered also that the present temper of our people is the growth of nearly a quarter of a century, and that conditions have been adapted to our existing scheme. Whatever the future may have in store for us, a sudden reversal of policy could not fail to bring with it certain confusion and possible disaster. For economic reasons, if for no others, we need unification of courses and a system of examinations, so far as these can be secured without degrading educational ideals, or sacrificing the interests of pupils, teachers, or the general public. We cannot abolish examinations at present; for my part I do not think it would be well to abolish them under any circumstances; but we may reduce their number and their importance.

I submit, accordingly, for the consideration of the Education Department, the following suggestions for the modification of the regulations when next they are amended:

EXAMINATIONS.

The examinations should be held only for absolutely necessary and specific purposes. Under this condition, we should have in our High School system only three examinations controlled by the Education Department: the entrance and the two teachers' non-professional examinations on the subjects of the two highest forms. I have described these as absolutely necessary. The time has not yet come, if it ever does come, when a

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graduation diploma issued by either a High or a Public School Principal can be accepted in full. It is a necessity of the situation that the academic preparation of our Public School teachers should be done in our High Schools, but if proper precautions are taken, no disadvantage can result to the other pupils. The work is academic and can be made to suit more than the one class. From one point of view, it might be better if the teacher's non-professional examination were held when he presented himself for admission to the training school. The immediate examination pressure on our High Schools would be less. But the regular matriculation examination, which was once held just before the Universities opened in the fall, is now held at the close of the school session, so that the matriculant shall not have to fag at his studies during the hot months of summer and may have a needed opportunity to recruit his energies for the arduous duties of his University course. This is a wise provision, and the teacher needs it as much as the matriculant.

Under this proposed reduction of our departmental examinations, the first that would affect the High Schools would be held at the end of the present Form III.; and, in this way, for three years at least, the teacher and the ordinary pupil would be free from the direct influence of the outside examiner. This involves, of course, the abolition of Junior Leaving, Part I. It seems to me unnecessary to discuss the propriety of this change. The examination has shown itself to be an unnecessary interference with High School work; and, as a Public School Leaving examination, it is an inadequate test; for it covers only some of the subjects of Form V. and has led to the neglect of the others. This is recognized to be the fact from Windsor to Williamstown.

The proposal involves also the abolition of the departmental commercial examination and of the departmental commercial and leaving diplomas. The business requirements of different localities and the capabilities of their schools differ among themselves. The question of a commercial examination and of a diploma should be left to the local Boards; for such diplomas can have at best but a local value. Some years ago Galt held its own examination on its own course and awarded its own commercial diploma, much to the advantage of all concerned. But this feature of the school disappeared under the pressure of attendance and the departmental examinations. As to leaving diplomas: If Boards wish to make the results of the matriculation and the teachers' non-professional examinations the basis or part of the basis of their award, well and good; the responsibility will be theirs. But they will have the power to take into account other important considerations which under a general system cannot be recognized. It will also be at their option to make their awards wholly on the examinations and other tests of their own staffs. For the last three years, indeed, the Toronto Collegiate Institutes have given their own graduation diplomas, taking into account other elements besides the results of the departmental examinations, and granting them to pupils who have passed neither the Junior nor the Senior Leaving examination. This practice should become general, and the Department can make it so by abolishing its present diploma certificates. In time, the diplomas granted by Boards may acquire a current value, and we may gradually reach the much-to-be-desired condition in which departmental control will be a far less important factor than it now is. With the diplomas would also disappear the names junior and senior leaving. These examinations should be conducted to suit the requirements of the Public Schools alone. This change and the omission of the languages at the first examination would direct elsewhere the zeal of the language masters, and so reduce the very great importance now attached to the teachers' examination. The Universities would control their own matriculation, using, as now, the machinery of the Education Department. The Medical Council, the Law Society, and other such bodies would select the courses and papers that suited them, prescribe their own standards, and receive such consideration in the way of special papers as the necessities of each case might justify.

(2) As I have already said, it is not now possible to abolish the examinations held by an outside board. In moderation, they are a means of stimulating work and of keeping in hand the general character of the teaching. We may, however, accept the teacher's certificate of the candidate's competency in certain subjects which do not lend themselves so readily to examination by an outsider, or the examination in which leads to a lopsided course of instruction. This reform would do much to improve the character of the teaching as well as to reduce the examination pressure. The proposal, as will be seen further on, may be readily applied in the case of the High School Entrance and Teachers' non-

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professional examinations. Here I may say that, so far as the Entrance examination is concerned, all the subjects are reviewed in the High School, and, in the case of the Teachers', they should be reviewed in the training schools. Indeed, many educationalists in Ontario have long been of the opinion that the practical divorcement of the professional from the non-professional side of the teachers' preparation has been carried too far; and that instruction in methodology should always be accompanied by a thorough review of the academic subjects. So far as the reading, drawing, book-keeping and botany of Forms I. and II. are concerned, the certificate of the Principal and the Chairman of the School Board is now accepted in lieu of a departmental examination. Under the operation of this regulation, the general character of the work has improved very greatly, and the relief thus afforded has been a boon to both pupils and teachers.

I am well aware that there are difficulties connected with the proposal to accept the teacher's certificate for part of the examination, and former experiments in this direction have, it must be admitted, not been encouraging. Then, however, the other conditions were unfavorable. Part of the present scheme is to make them more favorable. Under any conditions, this responsibility would, no doubt, be an onerous one for the teacher. He might be subjected to pressure from the parents and the friends of the pupils, and he might fear the result. There is force in this. But we have to choose between two evils, the greater by far being the inordinate pressure with its concomitant evils, under which every part of our school system now labors. One of the comforts of the examination by outside authority is that it relieves the teacher of responsibility; but there is reason to fear that this relief has not fostered independence of character and a strong sense of duty. It is high time we changed all this. Our teachers should all represent the highest type of manliness. A certain rich Greek once asked Aristippus how much he would charge to educate his son. Aristippus wanted ten talents. "But," said the rich man, "I could buy a slave for less." "Buy one," replied the philosopher, "and then you will have two."

But, in one way, the teacher's hands may be strengthened. A departmental regulation should forbid the admission of any pupil from another school who does not hold a letter of honourable dismission from his former principal. It is by no means uncommon for a pupil who is dissatisfied for any reason, to go or to threaten to go, to an adjacent school, where sometimes he is admitted without due consideration of the circumstances.

There is, however, another side of this question of accepting the teacher's certificate. There must be a reasonable guarantee that the subjects for which the teacher's certificate is taken are properly attended to. Under even a slight pressure the non-examination subject might, for a time at least, go to the wall. The minimum amount of time to be given should be prescribed as now in the case of reading and drill, etc.; and, as now, the principal and the chairman of the board should be required to certify to the observance of the regulation. No reduction of the prescribed time should be allowed without the consent of the Education Department on the report of the High School Inspectors, and the certificate should invariably be exacted. No reasonable man could object to this.

(3) At all the examinations—the Entrance, the Public School Leaving, the Matriculation, and the Teachers' non-professional—the teacher's confidential estimate should be a factor in determining the results. In any general system it is difficult to recognize this; but the difficulties are, in no case, wholly unsurmountable. The High School Entrance and the Matriculation are only promotion examinations when held for their proper purposes. Both pupil and teacher should look forward to them with absolute certainty that all proper allowances would be made, and that no fairly prepared candidate would be rejected. At the High School Entrance the difficulties inseparable from a scheme in which the "personal equation" of the teacher has a share would be less than in the case of the matriculant; for the Public School Inspector who must have at least some knowledge of the value of the teacher's opinion, is a member of the Board, and the Board itself is in a better position to deal with each case on its merits. This reform alone would do much to relieve the present pressure on both the pupil and the teacher of the Public Schools. True, the standard might not be absolutely uniform all over the Province and there might be cases of personal favoritism as well as of poor judgment. But these defects—if, indeed, the first is a defect (which, I doubt)—would be far outweighed by the resulting gain to education. Less consideration should, I believe, be shown at

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the Teachers' non-professional examinations. Here the candidate should display some maturity of judgment as well as due competency to teach the subjects of the Public School programme. For him, in many cases, his first examination is his last. For the High School entrant or the matriculant, it is only a step in a course which is not yet complete.

(4) The standard for the teachers' examination should be raised to 40 per cent. on each paper and 60 per cent. of the total on a curriculum and examinations made out to suit the requirements of Public School education; and the answers should be read by examiners who keep this object solely in view. Until recently when 50 per cent. of the total has been required for teachers, the standards of the University have been dominant at both the Matriculation and the Teachers' examinations. For various reasons, this has been too low—too low even for the universities themselves, and lower than is justified by the capabilities of the schools. The preparation of the Public School teacher for his duties has also suffered; for the standard has been insufficient for the requirements of most of our Public Schools. This, conjoined with the low standard set by the Model School Boards, has produced so large a supply that, in many rural sections, salaries have been reduced, and the schools are in the hands of mere youths who have no intention of remaining in the profession.

During the last fifteen years, the accommodations of our Public Schools have been greatly improved, far better methods of teaching have been introduced, and far better results have followed; but it cannot be denied that Public School education as a whole has not advanced commensurately with the advancement of other parts of the system. No doubt other causes have operated, but the immaturity and the inferior qualifications of the lowest grade of teachers have been a prime factor in the result. So long as most o teachers are women and so long as other available avenues offer greater inducements to men, the existing evils can never be wholly eradicated; but the present condition of affairs may be greatly improved.

From conversation and correspondence with Public School Inspectors and others, there are, I find, districts and ridings of counties for which the proposed standard would be too high and would produce what is said to be showing itself already, a dearth of teachers, owing to the low salaries these localities can offer. It will not do to keep the general standard low to suit the capabilities of the lowest. Our present system of district certificates should be continued. The examination therefor, might be held on the Public School Leaving papers with, if necessary, a higher pass percentage than that for the ordinary candidate; the answer papers being examined at Toronto, and the preparation of the candidates being confined to the High and Public Schools of these districts and counties. The last provision is an imperative necessity; otherwise we should have this work done in many of our High Schools, with all the evils of an additional examination. As is the case at present with the Art School examinations in some localities, these examinations would be taken, and the results would be paraded as so many counts in the record of the High School.

(5) The present examination scheme should be remodelled. One of the commonest objections to our examinations is their unreliability. It is often said, with good grounds, I believe, that, within certain limits, the poorly prepared candidate has just as good a chance of passing as the well prepared one; and one of the commonest complaints I hear in the schools is that the good candidate has failed while the poor one has passed. The proper recognition of the teacher's estimate will do much to remedy this evil. But cannot more be done? Each paper at the Teacher's examination, in particular, should contain more questions than the candidate is required to answer. The examiner can ask only a small number, which at best touch comparatively few points of his subject. We do not expect the average candidate to have mastered it completely; few would pass if we did; and the smaller the number, of questions set, the less reliable the result in the case of a qualifying examination. Under this provision, too, the examiner would have a greater freedom in setting his questions and an occasional oversight might not prove so disastrous or so embarrassing as it now does.

It was once the custom to value each paper at over 100 per cent, but the unification of the examinations led to its abolition; for the choice of questions allowed the teacher was often represented to be a source of embarrassment to the young candidate and the cause of his failure. It is, however, reasonable to conclude that the principle might be

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made general, if the teacher's estimate were given due weight; for it would remedy an occasional error of judgment on the part of the candidate.

The features of our system that most surprised the educationalists I met in the United States was the difficulty of our examination papers. We could, I believe, secure the desirable thoroughness if our questions in some departments were less exacting, and our pass standard and our standard in valuing the answers were more so. No system of examination is in practice exactly what it seems to be on paper; but the discrepancy in our case is too great. After many years' experience in connection with all phases of this kind of work, my conviction is that if the reality corresponded to the appearance, a very large number of those now reported as passing would not survive. The departmental examinations are merely qualifying; they are not competitive. All the questions should suit the average candidate, and the standard for valuing the answers should be an accurate one. Otherwise, wrong ideals of scholarship are set up; and the successful candidate is tempted to a self-reliance and a self-sufficiency unwarranted by the facts. There are, I need not say, other moral considerations connected with this question; but on these I need not enlarge.

It goes without saying that none but the most experienced teachers should act as examiners and associate examiners—teachers who are also conversant with the requirements and capabilities of our system. The Board of Examiners of the University of the State of New York is a permanent one, and in England, I believe, men make examining a profession. We cannot yet have such permanency, but a reduction in the number of examinations held by the Department would enable it to secure and retain the services of thoroughly competent teachers. More than legal qualification is necessary to make a good examiner; and, when the examiner is found to be a good one, he should hold office until an equally good one is found to replace him. Perfection in anything is impossible in this world, but this world will be better if we strive to attain it.

(6) Lastly, I recommend most strongly that the results of the departmental examinations be not published in the Toronto dailies. They should be sent for communication to the candidate, to the Principal of the school, or, in his absence, to the secretary of the School Board, and, in certain cases, to the Public School Inspector—anything rather than the plan we now follow. That the plan does not meet with the approval of the teachers themselves is shown by a condemnatory resolution passed at a late meeting of the Ontario Educational Association. The change would not, it is true, prevent the too frequent local jubilation over the results, with its invidious and often unjust comparisons; but, in time, a better spirit would prevail and the examination would take its proper place. Nothing has done more harm to secondary education in this Province than the annual exploitation of the departmental examinations. The adoption of the foregoing proposal would, I feel certain, do more to produce a healthy tone in our schools and set up a proper ideal of education in Ontario than any other change that could be made.

COURSES OF STUDY: GENERAL PRINCIPLES.

A few general principles need to be stated:

(1) The forms and the courses for a general scheme should be arranged to meet the capabilities of the average school. Progress should not be impeded by making a prime consideration of the shortcomings of schools that are insufficiently manned or insufficiently equipped. Modifications should be allowed, but no encouragement should be offered to two or three masters' schools to attempt work for which they are incompetent. As a matter of fact, the Continuation Classes are producing a new grade of schools, and the time is not far distant when the relation of such classes to the two-masters' High Schools will force itself upon the attention of the Education Department. In the matter of the Legislative grants the present scheme is an anomalous one.

(2) All the courses should be constructed solely on educational principles and in accordance with the actual necessities of the Province. Where not inconsistent with what is most important—proper culture and discipline—the courses controlled by the Education Department should be given a practical turn; so that, while being trained morally, mentally, and physically, the pupil may also acquire a knowledge of what is useful for general as well as for special purposes. But culture must be the main goal of our educational system.

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(3) The number of courses and the number of subjects therein and for each form should be reduced as much as is consistent with the objects of the courses and the requirements of the different localities. Pupils should have study periods especially in the lower forms; and I hope the time is at hand when each teacher also will have a period a day in which to help the backward pupil and attend to some other duties now forced upon him in school hours. Such periods are a usual provision of the American schools. The intensive study of a comparatively limited range is the most desirable characteristic of any curriculum; and, what is exceedingly important, as many of the subjects as possible should be relieved from the pressure of the examination. No artificial stimulus can wholly take the place of the teacher's sense of duty and his professional judgment.

Here again all necessary modifications should be at the option of the Board and the Principal. In other words, to meet the conditions of the different localities—conditions which will, in some respects, vary more and more as the years go by—we should have, within reasonable limits, greater flexibility and more local control of our courses of study. This is no new principle. A regulation now recognizes it in part: "In the case of pupils preparing for University Matriculation or taking the course for a Commercial Diploma, or where the Board introduces Manual Training or any other branch of technical education, on the recommendation of the Principal, less time may be given by the pupils concerned to one or more of the obligatory subjects of the High School course so as to meet as far as practicable the aims of the pupils."

Clause 9 of the present High Schools Act also gives the trustees of a school the power to prescribe the option to be taken at matriculation. All that is needed is a fuller recognition of the principle—a recognition, I may say, which would render unnecessary frequent and embarrassing changes in the Departmental Regulations. I should note here that, in a good many localities, particularly in the High Schools, Boards of Trustees take too little interest in the organization of their schools and throw too much responsibility upon the Principal. It is important that the latter should control the details of the organization and, within limits, the prescription of the duties of his assistants; but it would, I think, be well for our system if School Boards made themselves familiar with the requirements of their localities and decided which courses were to be taken up. A Bill introduced into the Legislature a year or so ago (but subsequently withdrawn) by the late Minister of Education contained a provision which, in my judgment, is a most desirable one. It threw upon the High School Boards the responsibility of the selection of the courses, a selection to be made at a special meeting to be held in the last quarter of the academical year. Some High School Boards are too ready, I find, to throw upon the Principal the responsibility of refusing to take up subjects, and I have known cases where the latter has been greatly embarrassed. The Principal, of course, being the expert in the subject, would be the main adviser, but Boards should not shirk their responsibility.

COURSES OF STUDY.

The following courses, in my judgment, conform to the general principles laid down above as far as it is possible to do so with due regard for all the interests involved. I deal here with the outlines: the details I will discuss further on.

Public School Courses.

My report is concerned chiefly with the High Schools; but some of the Public School courses are closely related to those of the High Schools through the Entrance and the Public School Leaving examinations, at which points pupils enter the High Schools. The interests of both classes of schools would, I believe, be served by the adoption of the following courses and examinations:

Fourth Form Subjects.

Reading, Writing, Spelling, Geography, Grammar, Composition, History, Arithmetic, Drawing, Hygiene and Nature Studies.

Subjects of High School Entrance Examination.

Group 1. Reading, Writing, Spelling, Geography, Grammar, Composition, Arithmetic.

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Group II. Literature, History, Drawing, Hygiene, and Nature Study.

The papers for Group I. to be set as now by the Education Department; the answers to be valued and adjudicated upon finally as at present; and the teachers' formal confidential report to be given due consideration.

The examinations in the subjects of Group II. to be held by the Principal; and his report thereof, endorsed by the Public School Inspector, to be accepted by the High School Entrance Board.

Fifth Form Subjects.

Reading, Geography, Grammar, Composition, Arithmetic, Literature, History, Algebra, Euclid, Drawing, Book-keeping, Elementary Science (including Agriculture), and the languages (Latin, Greek, French, German) *when a competent teacher is available and the organization will permit.*

Public School Leaving Examination.

From all I can learn, the abolition of the Public School Leaving as an examination partly controlled by the Education Department would be contrary to the wishes of most of those connected with the Public Schools. It is probable, too, that, in the present temper of the people, its abolition would be followed by a partial collapse of educational effort. We may, however, adopt a scheme on the same lines as are the other proposed examinations. But it would, I hold, be unjustifiable to continue to dislocate the High School system in order to give the Public School Leaving a value for a teacher's certificate. The attendance at the Continuation Classes is on the same financial basis as is the attendance at the High Schools. If there is not enough zeal on the part of all concerned to induce the pupil to attend the Fifth form of the Public Schools, we should wait until there is. The sooner we give up attempting to induce pupils to take an education because it has a denominate value in dollars and cents, the better will it be for Ontario.

The following is the scheme I suggest for this examination:

Group I. Reading, Geography, Grammar, Composition, History, Arithmetic, Algebra, Euclid.

Group II. Literature, Drawing, Book-keeping, Elementary Science.

As in the case of the Entrance, the papers to be set by the Education Department on the subjects of Group I. and the examinations to be conducted by the same Board and in the same way, except as already noted, where the papers are to be used to test the qualifications of teachers in the districts and the less advanced counties. In this case, the papers must of necessity be examined and adjudicated upon by a central Board of Examiners; but the teacher's examinations and his general estimate of the candidate's fitness should be accepted as proposed below in the case of Teachers' Non-professional examinations.

HIGH SCHOOL COURSES.

At present our programme recognizes only four forms. Practically, except in the smaller schools, there are at least five, where the work of Form IV. is taken up. In schools with four masters—the smallest number capable of doing effectively all the work of all the forms—Form II. has usually been divided. Now, however, owing to the abolition of the Primary and to the examination pressure on promotion, what is really the upper division of Form II. is frequently counted a division of Form III. To do the work of our programme with proper regard for both the pupil and the teacher, there should be five forms to correspond to the five years it actually takes the average entrant to complete the work. The necessary modifications of this division of forms would, of course, be made by the smaller as well as by the larger schools.

I submit, accordingly, the following scheme of subjects which may be taken up in each Form. It is made out on the basis of eight periods a day, and the number in brackets after each period shows the amount of time that should be devoted to each subject under normal conditions:

CURRICULUM OF SUBJECTS.

FORM I. Reading (3), English Composition (4), English Literature (3), English Grammar (3), Arithmetic and Mensuration (4), Canadian History with elements of Civil Government and duties of citizenship (3), Geography—Political [first term] and Physical

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[second term] (3), Elementary Science (3), Drawing and Writing (4), Physical Culture (3), Latin (5), Commercial course [special] (3), Manual Training with special Drawing (7), Domestic Art (3).

FORM II. Reading (2), English Composition (4), English Literature (3), English Grammar (3), Arithmetic and Mensuration (3), Algebra (4), Euclid [Second term] (3), Outlines of English History with civil government (3), Physical Geography [First term] (3), Elementary Science (3), Drawing (4), Commercial course (5), Latin (5), Greek (4), French (4), German (4), Manual Training with special drawing (10), Domestic Science (3).

FORM III. English Composition (3), English Literature including Reading (3), English Grammar (3), Arithmetic and Mensuration (3), Algebra (4), Euclid (3), Outlines of English History (3), Elementary Science (3), Physical Culture (3), Latin (5), Greek (4), French (4), German (4), Commercial course (8), Drawing (5), special technical work (10).

FORM IV (now Form III). English Composition (3), English Literature, including Reading (3), Ancient History with review of English History (4), Algebra (4), Euclid (3), Physics (5), Chemistry (5), Latin (7), Greek (4), French (5), German (4), Physical Culture (3), Special technical work (15), Drawing [Special Art Course] (5), Arithmetic and Mensuration, and English Grammar [special for teachers] (each 2).

FORM V (now Form IV.) English Composition and Rhetoric (2), English Literature, including Reading (4), English History [1492-1885] (3), Algebra (4), Euclid (3), Trigonometry (3), Chemistry (4), Physics (4), Biology or Mineralogy and Geology (4), Latin (7), Greek (5), French (5), German (5).

COURSES OF STUDY.

The subjects for matriculation and the preliminary professional examinations are prescribed by outside authority. Only those subjects, with Reading, Drawing and Writing, and Physical Culture, should be obligatory on candidates therefor.

The following is the general scheme of courses to be controlled by the Education Department:

Group I. Obligatory Subjects of Forms I—IV.

Reading, English Composition, English Literature, English Grammar (of Forms I.—III.), History, Geography, Arithmetic and Mensuration (of Forms I.—III.), Algebra, Euclid, Drawing and Writing (of Forms I. and II.) Elementary Science (of Forms I.—III.), Physical Culture.

Group II. Elective Courses.

One to be taken; not more, without the consent of the Principal.

(1) General Culture; (2) Domestic Science and Art; (3) Commercial; (4) Agricultural; (5) Technical; (6) Art Course; (7) Teachers' non-professional.

As to group I.: The subjects are those which should be taken by the average pupil who is to remain at school for at least four years after having passed the Entrance examination. The High School Principal should have the power to omit or modify any of them in the case of pupils for whose physical or mental capacities they are unsuitable, to whose future calling they are not adapted, or whose attendance is likely to be too short for them to derive proper benefit from a partial course. Under this scheme all the necessary flexibility is secured. In the last case, too, the pupil should be permitted to take the commercial course with Form II. or, if necessary, a special class of Form I.

As to group II.: The subjects for the teachers' non-professional examinations are fixed by the Education Department. Those for the other elective courses, as regards both their number and their details, should be at the discretion of the High School Board, within such necessary limitations as may be set by the Regulations.

Of the subjects of Form V. English Composition, English Literature, and History should be obligatory; the others, elective, any four being regarded as a full course, subject to the same conditions as are the subjects for forms I.-IV.

Teachers' Non-Professional Examinations.

The only High School examinations controlled by the Education Department would be the two teachers' non-professional examinations. The following schemes are in line with those I have proposed for the other examinations:

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FIRST EXAMINATION.

Group I. Subjects of Form IV.: English Composition, English Literature, English Grammar, English and Ancient History, Arithmetic, Algebra, Euclid, Physics, Chemistry.

Group II. Reading (of Forms I.—IV. inclusive), Book-keeping (of Form II.), Drawing (of Forms I. and II.), Geography (of Forms I. and II.), Elementary Science (of Forms I.—III. inclusive).

In the subjects of group I. the Education Department would examine as at present, the teachers' estimate being given due weight. In those of group II. the Principal and his staff would examine, and their report would be accepted by the Educational Council, when endorsed by the High School Inspector or other authorized Departmental officers. Under this scheme no certificate should be valid except that of a High School or Collegiate Institute Principal or of the Principal and staff of a Continuation Class in a Public School (or in a Private School of a similar character) equipped and organized satisfactorily, as reported by an officer of the Education Department. Practically such Public or Private Schools would be High Schools with a more limited programme. In the case of pupils coming from other schools where they have done some of the work, the Principal of the High School would not grant the certificate until he is satisfied as to the competency of the candidate. It is a necessity of the educational situation in the Province that the work of preparing teachers should be done in the High Schools, and it is desirable to recognize local interests. But it would be a grievous calamity to education if the interests of the large majority of the pupils were sacrificed as is now too often the case, to enable ambitious Boards and School officers to attempt work beyond the capabilities and necessities of the Public Schools.

SECOND EXAMINATION.

Subjects of Form V. English Composition and Rhetoric, English Literature (including texts of Form IV.), English History, Algebra, Euclid, Trigonometry, Physics, Chemistry, Biology (or Mineralogy and Geology), and Latin (including texts of Form IV).

On these subjects, as now, the Education Department would hold the examination; but the Principal and teacher's certificate that the work in Science had been taken up practically (endorsed by the High School Inspector) would be accepted in lieu of the present practical examinations in that department.

The examination to be taken at one time, or to be divided into two parts and taken at different times as follows:

Part I. (to be taken first): English Composition and Rhetoric, English Literature, English History, Algebra, Euclid, Trigonometry.

Part II. English Composition and Rhetoric, Algebra, Chemistry, Physics, Biology, (or Mineralogy and Geology), Latin.

The examinations in the two most important English and Mathematical subjects are repeated in Part II.; so that, when the candidate passes, he will have them fresh in his mind.

Candidates who, in addition to the certificate of competency in certain subjects required for the first examination, present also a certificate from the High School Principal that they have passed a satisfactory examination in Arithmetic and Mensuration and English Grammar, to be allowed to take the second examination without passing the first.

It is proposed to divide the examination into two parts, as now, for the following reasons:

(1) Such division will lessen the examination pressure. Few candidates but those of good ability who have taken the regular course in the Forms, could pass in all the subjects at one time; and yet all are necessary parts of the teachers' preparation or are needed for culture.

(2) Teachers could prepare at home wholly or partly for Part I.

(3) Teachers who wished to matriculate from this Form could do so without any great effort by adding to the subjects of Part II. the other language prescribed by the universities.

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REMARKS ON THE COURSES.

It is unnecessary in a report like this to attempt to give the details of the different courses. If the principles of construction are accepted, the details can be readily supplied. I must, however, add some remarks in explanation of the proposed curriculum.

High School Entrance Standard.

The average age last year of the entrance class of the Hamilton Collegiate Institute was 14 years and 3 months; and, as Principal Thompson tells me, it seems to be impossible to have pupils ready any earlier. The Hamilton Public Schools are of the highest type we have, and this may be taken as the best that can be done properly under our system. I have no sympathy with those who advocate the admission of pupils when they are 9 or 10 years old. But they should enter earlier than now. Probably the least defensible proposal ever submitted to the Education Department was one to begin the High School course after the subjects of the Public School course have been completed. True, this is the general rule in many parts of the United States. No one, however, who knows the situation can maintain that, in the subjects that are the mainstay of liberal culture, the product of the American High School is to be compared with the product of the secondary schools of Great Britain or Germany. But this is not the rule in the most advanced cities. In Boston, with its nine grammar grades, besides coming from the highest, pupils enter from the sixth (over eleven years of age); and in other cities, as in Brookline, provision has to be made for the languages in the two highest grammar grades. So far as our entrance classes are concerned, the opinion of many educationalists of this Province—in which I heartily concur—is that enough of energy is now expended by both pupil and teacher to reach a proper standard at 13, or thereabouts. What is chiefly needed, is the rationalization of our methods of teaching and examining.

English.

The general aim of a course in English should be to impart a knowledge of the structure of the language, to develop ease, fluency, and correctness in both oral and written speech, and to give an acquaintance with and a taste for our finest literature. Systematic composition and wide and well chosen courses of reading are the main objective points. In our Public Schools, grammar is, I believe, begun too soon. Form IV. is early enough, and the scope of the subject for a boy of 11 or 12 is narrow, indeed. The attempt, too, to train him to give reasons for the correction of "false syntax," except in the simplest cases, is a useless one. He has neither the logical power nor the necessary knowledge. The same remark applies in a degree to the first year in the High School. For the ordinary pupil, the subject should not be made an important one until the second and third years of the High School course, and then less of the analysis and parsing that sometimes form the staple of the teaching is much to be desired. Special arrangements for teachers must be made, but these need not interfere with the general interests. As to English composition: this subjeet should be emphasized throughout the whole school course: to be able to marshal our thoughts in suitable language is the highest product of culture. Owing to the pressure of the plucking subjects, English composition now suffers from comparative neglect in both the High and the Public Schools. Oral reading, also, as I have shown, should have more attention. Besides being a most admirable culture subject, it is the best means of systematically removing the defects of enunciation and expression, to which the young Canadian is especially prone. It is an unfortunate necessity of the situation that so much time has to be spent in formal reading in the High Schools; they have now to make up for the defects of the Public Schools. In literature, our courses are also in need of amendment. Reading must be both intelligible and intelligent. The examination in oral reading will test the intelligibility, and, under proper training, the intelligence: I propose to test the latter more fully at the Entrance and Public School Leaving by a paper similar to the present "literature" one, but constructed with this object solely in view. Until most pupils are at least 16 or 17 years of age, the sense of literary beauty is very small;

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but we may cultivate the taste for good literature by directing the reading from the first. No one supposes, I am sure, that our present grind over the prescribed selections in the Public School Reader can do this. Supplementary reading and the present freedom in the lower forms of the High Schools (whence the High School Reader should be banished), conjoined with the greater maturity of the pupil and the vivifying influence of a cultured teacher produce more satisfactory results. Even here, however, there is much room for improvement. The American scheme is, in many respects, a better one than ours. In it, generally, a course of reading, consisting of a dozen or more suitable books, is laid out for each school grade, beginning usually with the second in the Grammar School. The books are provided either by the Boards; or, as I will show later, by the Public Libraries, and the subject is made an important feature of the course.

The following extract from the report of the Superintendent of the Utica Schools shows what is being done there in the Grammar Schools; a similar scheme is followed in all the High Schools I visited:

> In our curriculum, three courses in reading are provided: one for the regular exercises during school hours, one for teachers to read to the pupils, and one for the pupils to read out of school. Each of these has its special purpose and province. The first is the ordinary reading work of schools, and is designed to furnish the main opportunities for teaching the pupils to read. The second should be used to impart information, to set good models of reading, to interest the children in good reading and noble themes, and to inspire them with high ideals and lofty purposes. In the third course, teachers may do very much to direct the reading of the pupils into right channels, and to cultivate the habit of reading only good literature. One plan for getting the pupils to read the desired books and for deriving the most good from such reading, would be for each teacher to have charge of a certain part of the pupils with reference to this outside reading—to advise as to books to be read, to discuss books when they have been read, and to keep account of the reading done. In order to get credit for reading any book the pupil must report it to his teacher and give such an account of the book as may be required by the teacher. Teachers will keep a record of books thus reported and discussed.

This is what I mean by "Literature" in the scheme for our Public School Entrance and Leaving. The examination there spoken of is one that could be conducted by the teacher in any way and at as many times as he pleased.

The course should be introduced by each local board, as circumstances might permit. The progress of the rest of the Province need not be kept back because of the financial weakness or the indifference of some localities. Besides the usual literature examinations of Forms IV. and V. of the High schools, a similar certificate should be expected from the Principal of the High school. Here there would be less difficulty; for most of our High schools have fair libraries, and it will be easy to utilize the public one. I should add to this statement in regard to English, that, in many parts of the Province, the prescription of a spelling book out of which the dictation is to be taken, is felt to be another wrench of the examination screw. The propriety of the prescription is also more than doubtful from the educational point of view.

History and Geography.

Probably no subjects press more heavily on Form IV. of the Public schools than history and geography. The former has always been a grievance, and the necessary memorization of details connected with both has been proved to be excessive. In the proposed scheme for the Entrance examination, the course and the examination in history are to be left to the staff, and it should be understood that the course and the paper in geography will be less exacting. The amount of geographical knowledge that serves the ordinary citizen is by no means great. When he needs a fact that he does not know, he simply hunts it up. It is worth more to know where to find and how to use details of current value than it is to have burdened the mind with a load that soon becomes obsolete. In the High school, a few months' special study is ample. No new text book is needed; the Public school geography contains enough, and the subject in its political and commercial aspects should be taken up in connection with history. Physical geography, "the study of the physical environment of man," is the side of the subject that connects it with science. It is a High school subject and should be made an important one. As we count time, its facts are permanent, and it lends itself readily to the best kind of training. In the American schools it is made as practical as possible; trips being taken, especially in the large cities, to observe and discuss the character and phenomena

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of the surrounding country. Most of our pupils need only to have their eyes opened to their surroundings. The following course is from the report of the Committee on College Entrance requirements for 1899, and shows what some aim at in teaching physical geography; books of reference, no text books, are used:

Figures in parentheses indicate the number of hours for each exercise.

Cause of day and night, and extent of sunlight over surface, (1). Determination of latitude, north and south line, and high noon, (1). Determination of difference of longitude by sending watch, (1). Finding variation of local and standard time, (1). Making maps on different projections, (4). Study of ocean-current maps, (1). Study of tide charts, (1). Study of map of the world, showing heights of land and depth of sea, (2) Difference in temperature between the top and bottom of a hill, (1). Finding height of hill or building by barometer, (1). Determination of dew-point, (1). Making isotherm and isobar maps from furnished data, (4). Study and reproduction of weather map, (1). Predictions from weather maps (written with reasons), (2). Observations of rain-fall, temperature, velocity of the winds, etc. Determination of the amount of snow-fall and the amount of water produced by an inch of snow, (1). Observations of ground temperatures, depth of frost, etc. Making contour and hachure maps from small models, (2). Drawing cross-sections from contour maps, (4). Written descriptions of models, (4). Picture-reading (written description), (4). Map-reading (written description), (4). Reproduction of contour map in hachures, (1). Making map of small area in neighbourhood, (1). Planning of journey, with study of country to be seen, (4). Determination of the amount of sediment carried by a stream, (1). Study of rocks and minerals, (10). Study of erosion by sprinkling-pot, (2). In fall, four excursions, one a week, (8). Four excursions in spring, (8).

As to history; until a pupil's logical powers are fairly developed, the study of history is usually little better than the memorization and connection of useful facts. This and the practical aspects of the subject have been kept in view in the construction of the High School course in the subject. The ancient history for Form IV. (now Form III.) is not simply the limited period for University matriculation, but such a course in Greek and Roman History as is contained in *Myers' Ancient History* (Ginn & Co., New York). Such an outline would give the ordinary student a fair idea of the whole subject. The University student has advantages not enjoyed by the large majority of those who take the High School course. It is unfortunate that our Form V. pupils cannot be given an outline of European history; but, with our methods and ideas, the course proposed is probably all that can be safely attempted at present.

Mathematics.

Around this department have been fought some of the fiercest fights of the educational arena. Of late years it "has fallen on evil days and evil tongues." Some sorrowful spirits still sigh for the golden days of its supremacy; but the large majority of the mathematical men are now at least as reasonable in their pretensions as are the members of the other departments. They complain, and I think justly, that the unification of the teachers' with the matriculation pass examination has lowered unnecessarily the standard of scholarship in mathematics, and they see, in this lowering of the standard a reason for the separation of the examinations. The same objection holds with English masters in the case of English grammar. It is to be hoped that any new course of study will provide suitable training in the two subjects which are of special importance for the Public School teacher. Ten year or so ago arithmetic and English grammar were banished from the U. S. High Schools. The Boston programme, given further on, shows that they are being reinstated. In some schools I found them "reviewed" in the last year of the course.

So far as my knowledge of the situation goes, not much fault can be found with the details of the courses in mathematics. Some complain that there is too great a gap between the algebra of Form IV. and that of Form V., and some would like to see modern geometry substituted for euclid. But the gap is due chiefly to the examination standards; and, until the University of Toronto sees fit to banish euclid, the latter subject need not be discussed. The faults of our mathematical courses are rather faults of method. As to the entrant from the Public School, the facts warrant the statement that he is too often inaccurate in mechanical work and ignorant of some important parts of elementary arithmetic. To quote the words of one of our most experienced mathematical principals in a district where the public schools are of good standing: "Not one student in ten who come to our High School can perform operations involving the four simple rules rapidly and accurately. This is due, I think, to the immense amount of time spent in the higher

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forms in solving problems, and in hair splitting analysis of the logic of the solutions; the latter being, with junior students, a sheer waste of time. In some schools in this district one hour and a-half a day is spent by the senior classes in arithmetic alone, and yet they come to us unable to do the work expected of a clerk in a store or in a bank."

The principal of one of our leading collegiate institutes expresses himself thus:

"My experience with pupils coming from the public schools is that they are sadly deficient in the elementary rules. They are exceedingly inaccurate in all mechanical work and seem to know next to nothing of fractions, vulgar or decimal. I think that, in the public schools, some attention should be given to mechanical work and mental arithmetic. Whatever course is laid down, the teaching will be largely governed by the character of the papers set. The examiner should be carefully instructed regarding the class of questions to be asked."

I may add to this that similar complaints are by no means unfrequent as to the character of the work done in many of the High Schools. The fact is our examinations have had too much control, too little has been left to the good sense of the different localities, and in our zeal for logical training we have ignored too much the claims of practical life.

The Languages.

I have already pointed out what is probably the chief defect of our language teaching—the neglect of pronunciation. So far as my judgment goes, our courses of study are good; what we need is a better standard of scholarship; pupils pass the examinations far too easily. I have known of some who have passed the Junior Leaving in Latin, for example, after three months' preparation. Six months is not an unusual limit, and a year is common. Indeed, in many cases, the second language for the Senior Leaving (in the honor course, be it remembered) has been got up from Sept. to July: I have found pupils reading Plato after a three months' preliminary course in Greek. Under these circumstances the complaint from the Universities that our schools do not (it is held, I believe, that they cannot) prepare students for matriculation by the time they are 17 is unreasonable. Our language departments are manned with honor university graduates; all that is needed is for the universities to set a proper standard, and the schools will adapt themselves to it. Subjects that are now emphasized too much as the result of other examinations will receive less attention, and the matriculant will be properly prepared in a reasonable time. Everything in the schools follows the flag of the examination.

It is held, I believe, in some quarters, not only that language study should be begun earlier, but that we should aim at a conversational knowledge in the case of French and German. I have already pointed out that there is ground for holding that the pupil now enters the High School too late; but there is no good ground for the second complaint. The ability to converse in French or German is for us of secondary importance. In our High Schools, practice of this kind is of importance only as a means of securing the higher objects of scholarship and literary culture. The amount of time necessary to obtain a conversational command of a language cannot possibly be given in our schools; and, as a matter of fact, it is not given in any University in Ontario. Even if it could, our geographical position and our trade relations are such that it would not now be of practical value to one in five hundred. The situation is of course, different in Germany and in other countries in Europe where a colloquial acquaintance with modern languages has a commercial value and where the teachers can themselves speak the foreign language. How many of our honor university graduates can do this? No system can be copied for Ontario: we have our own peculiar needs.

Obligatory Latin and optional French for teachers' certificates have created very large classes in these languages in our High Schools, classes too often, necessarily, very badly organized. The abolition of this provision would reduce the number, and would give the teacher the opportunity he has not now, to do individual teaching. Latin is too highly esteemed as an element of culture even by the *vulgus profanum*, and French and German are of too much practical value, ever to be relegated to a subordinate place in our Schools. Neither the modern languages nor the classical master need fear that he will be reduced to the straits of Othello; his occupation will not be gone.

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Science.

The course in science proposed begins with Nature Study in the lowest grades of the Public Schools, to be continued throughout into the Elementary Science of Forms I., II. and III. of the High Schools, and is to be completed by a systematic course in Physics, Chemistry, and Biology (or Mineralogy and Geology) in Forms IV. and V.

Nature Study or, as it is called in the British schools, "Object lessons in Science," and in the German schools, "Naturbeschreibung," is a term of wide and varying significance. Its content is not definitely settled, nor should it be; but teachers have come to include within its meaning the study of plants, animals, and simple natural phenomenon. I quote from the report of one of the American School superintendents:

Nature study furnishes a most valuable means of training the child to observe carefully and describe exactly; of developing the power to see, to think about what is seen, and to draw correct conclusions.

In all the work in nature study, the aim should be to foster the child's love for out-of-door life, to lead him to see the wonders and beauties in nature, and to rouse an abiding interest in and reverence for all God's creations. It may thus be made a means also of cultivating the child's higher nature and of awakening and training the feelings which constitute the basis of moral character. Facts will be collected, names will be learned incidentally, as a convenience in expressing the phenomena observed, but the mind will be occupied with the life and purpose ot the plant or animal observed and the adaptation of the parts to the work to be performed.

The material to be used in the study of plants and animals should vary with the season rather than with the grade of the class, the same material being adapted to the different ideas to be impressed from year to year. It should be used also as the material for drawing lessons that the result may show whether the pupils have really seen what it was desired they should see, and that opportunity may be afforded for applying principles learned in other drawing lessons.

Literary gems, simple ones to be read or learned by the pupils, more difficult ones to be read to the class by the teacher, can be associated with the nature work at every step.

No definite programme can be made on this subject; and none should be attempted. But, in order to give some definiteness to the proposal, I insert the suggestive scheme now in use in the first six grades of the Utica Grammar School; it is found in a work for teachers prepared by Prof. Scott of the Oswego State Normal School:

Grade I. PLANTS.—One or two plants as wholes, formation and dissemination of seeds, fruits, evergreens, buds, life history of bean or pea. one tree observed throughout year.

ANIMALS —Caterpillars and butterflies, snails, birds, shelter and protection of animals and men.

Grade II. PLANTS.—Two whole plants. (one a composite), dissemination of seeds, falling and color of leaves, fruits, grains, development of buds, life history of bean and pea, two trees observed throughout year.

ANIMALS.—Caterpillars and butterflies, crickets or grasshoppers, spiders, snails, snail and clam shells, domestic mammals, flight and return of the birds, habits of two or three birds.

PHYSICS.—Water, its forms and work. Air, its presence and uses.

Grade III. PLANTS.—Flowers, grains, vegetables, preparation of plants for winter, evergreens, buds, germination, forms and structure of leaves, tree flowers, life history of two unlike plants, two unlike trees, compared throughout year.

ANIMALS.—Spiders, ants, bees, beetles, or flies and their larvæ, crayfish, fish, turtle or frog, corals, birds.

MINERALS.—Fossils and limestone, quartz, soil-making, and formation of valleys.

PHYSICS.—Heat, its sources and effects upon solids, liquids and gases.

Grade IV. PLANTS.—Roots and stems, their forms and structure; leaves, their function, form and structure; careful observation of one or two trees for entire year; one or two whole plants.

ANIMALS.—Insects not studied before; some classification of insects; earthworm, habits and structure; mammals and other vertebrates; starfish and corals.

MINERALS.—Sandstone and stratified rock; granite rocks, formation, properties, transportation (by glaciers), and uses; soil-making and formation of valleys reviewed.

PHYSICS.—Heat; production, absorption, radiation, conduction and effects.

Grade V. PLANTS.—Ferns, two or three additional trees studied.

ANIMALS.—Articulates, including jointed limbed animals and worms, their life history, (development from egg), habits, relation to man, structure and classification.

PHYSICS.—Gravitation, pressure of liquids, and pressure of air.

Grade VI. PLANTS.—Flowers and fertilization, dissemination of seeds, preparation of plants for winter.

ANIMALS.—Insects and birds; life history, relation to environment and man, structure and classification,

PHYSICS.—Capillarity and osmosis, lever, pulley, wheel and axle, and inclined plane.

Nor should we attempt to make out a rigid programme for the Elementary Science of Forms I-III of the High Schools. In it also, no text books should be used by the pupils. A suggestive outline might be given, but the details and the order of the subjects should be worked out by the teacher to suit his environments and the necessities of his pupils. As far as possible the pupil's eyes should be opened to the processes of nature around him, and he should be trained to understand them as far as it is possible

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to do so. The course should consist of the elementary conceptions of physics, chemistry, and mineralogy and geology, with studies of plants and animals. As with nature study, the course should be given, when desired, an agricultural turn. The details in biology will present more difficulty than those in the other subjects. The following schemes will give an idea of what is proposed:

Studies of Plants.—Early fall and spring. The study of a typical plant, to become acquainted with the chief plant structures—root, stem, leaf, flower; functions of each structure; requirements for the existence and perpetuation of plants; variations in form and position of the various parts to meet the necessary conditions of living; the struggle for existence. Some plant diseases—black knot, rust, leaf curl, smut (corn).

Studies of Animals.—Collection during fall months of the cococons of various insects, especially those injurious to vegetation, and their preservation in suitable boxes through the winter; the practical study of these in the spring as they emerge from their cococons, the imago, egg, larva, and pupa and so far as possible, the life history of each; the study of the external features, habits and life history of the army worm, the tent caterpillar, the pea-weevil, bark lice, the codling moth, the cabbage butterfly. Full observations of the migrations of birds, records kept, similar observations in the spring of the returning birds and records of the order of arrival; their spring habits and fall habits; their plumage, song; resident winter birds and other animals, their adaptations for this climate; birds and animals beneficial and injurious to the agriculturalist and horticulturalist; general observations on animals, to become acquainted with various adaptations for securing food, for self-defence, rivalry, defence of young, meeting the conditions of their surroundings; community life as seen in bees and ants; some animal parasites and the resulting degeneration.

What should be aimed at in the teaching may be gathered from *Studies of Plants and Animals* (D. C. Heath & Co., Boston), which I saw in use in the Englewood and Hyde Park High Schools, Chicago.

In Forms IV and V, where the work should be taken up systematically, physics and chemistry should be made as practical as possible, and the agricultural applications of biology should be continued. To the present course in Form IV (now III) chemistry, for example, the following might be added:

Certain elements whose compounds are used in many industrial occupations; calcium and its compounds used in constructive work; sodium and its compounds used in the arts and manufacturers; aluminum, the uses of the metal and its compounds in the arts, &c. Silicon and iron.

A study of the compounds (their nature and action) used in the household for cooking and for cleansing; common adulterations and how to detect them; common poisons and their antidotes; germicides; the elements of sanitation.

In many parts of the province I have found a desire for a course in mineralogy and geology instead of the present one in Biology. In view of our vast mineral resources, the desire is a natural one and might be gratified without embarassing the schools if it were allowed where the biology of Form V will not be taken up. The elements of the latter subject would be provided for in the Elementary Science of Forms I-III. The following is to be credited to Prof. Miller, of the Kingston School of Mines:

PROPOSED COURSE IN GEOLOGY FOR FORM V.

1. Brief outline of the theory of the origin of the earth and other members of the solar system.
2. Planetary relations of the earth.
3. The Atmosphere, Water } Treated in a general way as the envelopes of the solid earth.
4. Solid crust and probable nature of the earth's interior.
5. General chemical composition of the crust.
6. Meaning of term Mineral; crystalline state of matter.
7. Meaning of terms Hardness, Streak, Lustre, and Specific Gravity, as applied to Minerals.
8. General chemical composition and physical characters (Hardness, etc.) of Graphite, Magnetite, Hematite, Pyrite, Galena, Gypsum, Halite.

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9. The rock-forming minerals Calcite, Quartz, Orthoclase, Plagioclase, Muscovite, Biotite, Hornblende, Pyroxene and Olivene.

10. The use of a simple table for the determination of common minerals.

11. The terms mineral, rock, ore compared.

12. Classification of rocks:—A. Igneous, B. Aqueous, C. Metamorphic. Examination of hand specimens of the following members of each class:—

A. Igneous Rocks.

1. Plutonic—Granite, Syenite, Diorite, Gabbro.

2. Volcanic—Rhyolite, with pitchstone and pumice, Trachyte, Andesite, Basalt, Diabase.

B. Aqueous Rocks.

Conglomerate, Sandstone, Shale, and Limestone.

C. Metamorphic Rocks.

Quartzite, Slate, Marble, Mica Schist, Gneiss.

13. Volcanic Action:—

Causes of volcanic action and description of the products of the action. Distribution of volcanoes and evidence of their former existence in Ontario.

14. Earthquakes:—Upheaval and subsidence of the earth's crust.

15. General Geological effects produced by Heat, Air, Water, Life.

16. Stratification—illustrated by beds of sand, clay, rock.

17. Bosses, Dykes, Veins, Foliation, Dip and Strike, Anticline, Syncline, Faults—meaning and illustration of.

18. Character and use of Fossils.

19. Outline of Geological History.

20. A general Geological map of Canada and of Ontario.

Age of the earth (data used in estimation of).

Practical study of the course.

The course proposed above aims at giving

(1) that general knowledge of the subject which a liberal education demands;

(2) that knowledge of minerals, their composition, occurrence, distribution and tests, of value to all specially interested in mining operations—the miner, prospector, mining broker, explorer, etc.;

(3) a knowledge of the interdependence of agriculture, forestry, &c., and geological phenomena and agencies.

The course may be carried out practically by

(1) making use of the collections of rocks and minerals sent out, on application, by the Geological Survey at Ottawa. (No.'s 7-12 in the above course may thus be studied)

(2) by short field excursions to gravel and sand pits, clay beds and limestone exposures for No.'s 15, 16 and 12 B, at the same time studying the formation, composition and physical and chemical characters of the soil.

Geological maps of Canada and Ontario for No. 20 may be obtained from the Survey at Ottawa or the Bureau of Mines, Toronto.

In certain schools favorably situated, other phenomena, for example, 17 and 18 may be illustrated by excursions to actual occurrences.

It is further proposed that the course in Chemistry be so related to the course in Geology and Mineralogy here outlined, that each will gain from the study of the other.

To show what may be done in a practical way in science I quote from a letter to me from Dr. Muldrew, now principal of the Gravenhurst High School; the Arboretum he speaks of is in the school grounds:

"While teaching in Madoc I found it both easy and interesting with the aid of students from different localities to make almost a complete collection of the minerals found so extensively in that part of the province. In Gravenhurst it has been found more practicable and more useful to establish in the sa me way and for a like purpose an arboretum, where nearly all the indigenous trees and shrubs of the northern forest belt may be seen and studied. There is everywhere abundance of material, for the method is far superior to the matter and when properly presented such work cannot fail to interest permanently. Besides being of great worth in itself, such work is the best introduction to specialized study and will be found equally valuable whether leading to the farm or the University."

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Drawing.

The work in Drawing is probably the least satisfactory in our schools. In many localities its value is reported to be small from almost every point of view. The course itself is satisfactory so far as it goes, but it should be more extensive, and our teachers should be be better trained. Few, indeed, have had any artistic training. The work I saw in the American Grammar Schools is ahead of that in even our best High Schools. In the American High Schools, it is usually excellent, consisting of industrial drawing of all kinds, drawing from casts and sometimes the living model. Painting in water colors is also common in all the courses. I may say in passing that I did not see or hear of a drawing book; the teacher does the work. The course in Drawing must be emphasized in our schools, for it is the only manual training most pupils can get.

I give below an illustration of what is done in the American schools. The curriculum is that of the W. T. Lincoln Grammar School of Brookline.

Kindergarten: Illustration of stories by blackboard drawing in construction.

Grade I. Autumn: Drawing of fruits and vegetables with brush and color. Train the eye to see large, simple masses. Muscular control is gained through use of brush.

Winter: Large objects, toys, dolls, animals and other things in which children are interested, drawn with color and brush.

Spring: Plant and animal life, buds, twigs, leaves, flowers, birds and insects. Use of water-color and colored crayon.

Grade II. Subject matter of Grade I. enlarged.

Grade III. Autumn: Drawing of autumn flowers, leaves, berries and pods in color. Study of curled leaves, pods, seeds and dried grasses with care in arrangement, using pencil, colored crayon or brush.

Winter: Connect drawing with history, literature and geography, using many pictures and illustrating each subject by child's free expression.

Spring: Study of life in the vegetable and animal world. Special study of buds and twigs to discover processes of growth.

Grade IV. Continue work of third grade, and introduce study of drawings by early Italian masters when feasible: Giotto and his followers.

Grade V. Autumn: Drawing in ink or color, fruits and vegetables, including branch or entire plant. Drawings large, with care for arrangement. Draw also birds, insects, geological specimens Connect with science and geography. Drawing of pods, berries and sections, with study of arrangement of seeds.

Winter: Invention. Arrangement of straight lines, squares and rectangles. Use motives found in autumn pods, berries and sections for simple repeats. Design Christmas cards, using holly or mistletoe, Simple exercises in composition drawing of line and mass, pose and object drawing in color, ink, or pencil.

Spring: Flowers, leaves, insects and bird life. Care in arrangement.

Grade VI. Continue work of fifth grade, enlarging the winter design work and in the spring using flowers, leaves and insects as motives for design.

Grade VII. Autumn: Flowers and fruits in color; landscape composition; section of vegetables, pods and nuts as motives for design.

Winter: Designs from autumn studies in balanced forms. Invention. Study of good examples of art in photography. Draw rectangular forms with attention to proportion and mass. Connect pose drawing with history, literature, and geography.

Spring: Drawing from pictures for analysis of line and mass in landscape. Sketching from window landscape, roofs or houses, also from doorways, halls or corners of school-room. Study of flowers and leaves with brush in color and ink. Arrangement in rectangles or circles.

Grade VIII. Continue work of grade seven, enlarging the winter design and spring landscape work.

Grade IX. Autumn: Landscape composition. Drawing in line and mass, from reproductions of pictures by Corot, Millet, etc. Inventive landscapes. Color used in flat wash in landscape composition. Enlarged drawings of sections of pods, vegetables, etc. Connect with nature study.

Winter: Invention: Motives obtained above used in surface repeats in black and white and color. Frequent study of good photographs for design and drawings of old masters. Object drawing and pose drawing in costume to connect with history and literature.

Spring: Large drawings of flowers for decorative use in tile plate and surface repeats.

Landscape sketching from windows and figure drawing.

PROPOSED DRAWING COURSE FOR ONTARIO SCHOOLS.

To give definiteness to my suggestions, I submit the following as a course in Drawing which may be taken up when we have competent teachers and the present examination pressure is reduced or removed:

PUBLIC SCHOOLS.

1. *Object Drawing.* This should in the lowest forms be co-related with Nature study, pupils being taught the drawing of familiar natural objects, such as leaves, flowers, fruits, etc. The objects should be of such a character and so placed as to avoid perspective positions. Memory drawing of the same and similar objects should follow the drawing from the models. The drawing should at first be made in light broken out-

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line as unlike ruling as possible. Shading should be introduced at an early stage, but should at first be a mere suggestion.

Young children take a special interest in color. The drawing of natural objects in color may, therefore, with profit be begun in the second form. In fact in some of the schools of the United States excellent work in color is done by pupils in the lowest grades.

In Form III. the drawing of models of rectangle forms in perspective positions may be introduced, but all technical terms should be avoided. The main aim here should be to teach pupils to see objects and to draw them as they really present themselves.

2. *Designing*. Designing of every kind comes next to the freehand drawing of objects in its adaptability to public school work. It should embrace the principles requisite for the invention of patterns suitable for fabrics, wall-papers, tile-floors, etc. A beginning can be made with the youngest pupils in outlining patterns. The spaces may afterwards be filled in with flat color as is done in the making of maps. This is an excellent beginning for more advanced full-colored shaded work.

3. *Copying*. Copying from drawings should be resorted to sparingly, and when demanded of pupils should be mainly for the purpose of improving technique and furnishing ideas for designs.

4. *Elementary Projection*. Where manual training is carried on in Public School classes, the drawing of plans, sections, etc., will of course form a part of all constructive exercises. As commonly taught apart from such exercises, this kind of drawing has but little value.

5. In addition to the subjects already mentioned what may be called Inventive Drawing such as the illustration of lessons, the drawing of imaginary scenes, etc., forms an excellent exercise for the higher forms.

High Schools.

I. *Lower Forms.*

The High School drawing course continuing the Public School course should consist of :—

1. Advanced work in drawing from models in (*a*) light and shade, (*b*) color.
2. Memory drawing both in outline and shade.
3. Simple principles of free hand perspective, introducing the more simple terms.
4. Incentive illustrative drawing.
5. Ornamental design, using outline and outline and color, introducing practical geometry and showing its application to design.

II. *Upper Forms.*

1. Advanced drawing from objects and outdoor work from nature.
2. Charcoal drawing from casts.
3. Ornamental design with color.
4. Projection of solids.
5. Machine drawing with instruments.
6. Styles of architecture and simple architectural drawing.

Teachers' Examinations.

If we are to have Nature Study in our Public Schools, we must prescribe for the teachers' non-professional examinations, our science courses with their practical applications. In the Normal and Model Schools, the teacher will be trained on the pedagogical side, but the High Schools must provide the main part of the instruction. The abolition of the options for this examination which is the goal of most of the effort in the schools, will do much to reduce the general pressure, and the prescription of Latin for the higher grade should ensure wider culture for the man or woman who makes teaching a profession. I have pointed out already serious results that have followed from making Latin obligatory for the lower grades. I add the following considerations:

(1.) Many pupils now enter Form II and even Form III without any preparation in Latin. Disorganization of the form and a hurried cram of the subject naturally follow.

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(2) All pupils, especially those described in (1) above, spend more time on their Latin at home than on almost any other subject—sometimes more than on all the others put together.

(3.) The result of (2) is that insufficient time is given to preparation in the Public School subjects. Latin is, of course, not wholly to blame, but it is the most important factor in the result.

(4.) The arguments advanced for the study of Latin are the language and the logical training it gives. The one great argument—the inestimable value of its literature—cannot be urged in the case of the large majority of those who take it up in our Schools. Its value in the elementary stages will always be a matter of opinion. In my humble opinion, the discipline of classical study in the stage at which the large majority of our pupils finish it, can be obtained better from studies which touch more closely the practical life of the large body of our population.

But these objections do not hold the same extent against Latin for the second examination. The course represents some culture if the standard is a really good one. No unnecessary pressure will be put upon the pupils of Form I. Many intending teachers will take some Latin before they reach Form V.; and the few who do not, can take two years to prepare Part II. There is force in the objection that the existence of this requirement for the higher and not for the lower grade may prevent some from going on. But, if the standard of the first examination is raised, and especially if salaries increase, it will be worth the teacher's while to prepare himself for the higher grade. I may add that the teacher's courses, while not necessarily identical with those for the University, should include the work therefor, so that no barrier would be placed in the way of those who desire to take a University course. May the time soon come when all our Public and Highschool masters shall be the cultured products of the best University life!

PRACTICAL COURSES.

In the commercial course, as now, book-keeping and commercial transactions, stenography and type-writing would constitute a part, the obligatory subjects being all taken except, perhaps, euclid and algebra, in the case of those who remain at school for only a year or so. Flexibility in this course is much to be desired. As to domestic science and manual and technical training, I suggest no detailed courses, partly because my own experience is limited and partly because the details should be left to the Board and a competent staff. In a technical education, English, Mathematics and Science—the last two in their practical applications—should always form an important part, and in the other courses, the obligatory subjects should be prescribed.

AGRICULTURE.

One subject yet remains, representing probably the most important interest in Ontario. Is nothing to be done in our schools for Agriculture? The question of agricultural teaching was one of those considered by the Imperial Commissioners for Ireland on Manual Training and Practical Instruction. The following quotation puts the case admirably even for Ontario:

> We are strongly of opinion that even if the instruction were more efficiently given, the subject of Practical Farming forms no fitting part of the programme of a primary school. The details of the art of agriculture can only be learned by practice on a farm and by pupils who are, as a rule, beyond the usual primary school age. The attempt to teach these details theoretically to children of school age can be of little profit. As regards the scientific aspect of agriculture on the other hand, some preliminary training in the simplest elements of Natural and Physical Science is absolutely necessary for a proper appreciation of the bearing of scientific principles on the practice of farming. While therefore we fully recognize the great importance, especially as regards Ireland, of instruction in Practical Farming, we consider that this should be given only in special schools of a technical character.
>
> We are, consequently, of opinion that the course in Agriculture at present prescribed for National Schools should be altered. The new course should consist of instruction in the elements of the Natural and Physical Sciences that have a direct bearing on Agriculture; and this instruction should be given with the aid of experiments of a simple character, performed as far as possible by the pupils themselves. Such a course of instruction will be of a nature entirely within the capacity of the children of a primary school. It will afford a good disciplinary training for all children, even for those who are not to be subsequently engaged in the practice of agriculture, while it will enable those who are to be so engaged, at a later stage to make intelligent use of scientific treatises on the subject.
>
> The course in Agriculture, thus modified, will naturally constitute the course in Elementary Science for boys in rural schools.

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In this connection we beg to draw attention to the following extract from a publication recently issued by the French Government on the "Teaching of Elementary Ideas of Agriculture in Rural Schools," which clearly expresses our views on the matter:

"Instruction in the elementary principles of agriculture, such as can be properly included in the programme of primary schools, ought to be addressed less to the memory than to the intelligence of the children. It should be based on observation of the everyday facts of rural life, and on a system of simple experiments appropriate to the resources of the school, and calculated to bring out clearly the fundamental scientific principles underlying the most important agricultural operations. Above all, the pupils of a rural school should be taught the reasons for these operations, and the explanations of the phenomena which accompany them, but not the details of methods of execution, still less a résumé of maxims, definitions or agricultural precepts. To know the essential conditions of the growth of cultivated plants, to understand the reasons for the work of ordinary cultivation, and for the rules of health for men and domestic animals —such are matters which should first be taught to everyone who is to live by tilling the soil; and this can be done only by the experimental method.

"The master whose teaching of agriculture consists only in making the pupils study and repeat an agricultural manual, is on the wrong path, however well designed the manual may be. It is necessary to rely on very simple experiments, and especially on observation.

"As a matter of fact, it is only by putting before the children's eyes the phenomena to be observed, that they can be taught to observe, and that the principles which underlie the science of modern agriculture can be instilled into their minds. It should be remembered that this can be done for the rural agriculturist only at school, where it will never be necessary to teach him the details which his father knows better than the teacher, and which he will be certain to learn from his own practical experience.

"The work of the elementary school should be confined to preparing the child for an intelligent apprenticeship to the trade by which he is to live, to giving him a taste for his future occupation; with this in view, the teacher should never forget that the best way to make a workman like his work, is to make him understand it."

What we can do and all we can do in our Public and High Schools, is to construct our school courses so that they bear upon agriculture. Mr. James's very excellent manual can be taken up by the teacher as part of the Nature Study of the Public Schools, and of the Elementary Science courses of the High Schools; and the Science of Forms IV. and V. can, as I have shewn, be adapted to the same purpose. No country has succeeded in doing more than this. The farmers' laboratory is too large for any school but the special one. In Part I. I stated that I had visited the agricultural department at Cornell: I had heard that it had done something for the Public Schools of New York State. Part of its extension work, I find, consists of summer lectures on Nature Study, and the regular publication of leaflets on the same subject (widely distributed) for the use of the primary teachers. These give the Nature Study an agricultural turn, and Prof. Bailey tells me that they are very popular and that the results have been exceedingly gratifying. Some of the titles of these pamphlets now before me are:

A Children's Garden, Cuttings and Grafts, The Burst of Spring, A Brook, How Plants Live Together, Hints on Making Collections of Insects, The Leaves and Acorns of our Common Oaks, The Life History of the Toad, The Birds and I, How the Trees Look in Winter, Evergreens and how they shed their Leaves, Autumn Leaves, A Summer Shower, A Handful of soil, The Potato.

This scheme is, of course, practicable for us, and it could be carried on under the direction of the Minister of Education or the Minister of Agriculture. In our new-born zeal for Industrial Education, it will not do to subordinate the claims of other departments of at least equal importance.

U. S. English and Latin High Schools.

Although the special object of my visit to the United States was the Manual Training School, I visited besides a good many of the co-ordinate English and Latin Schools. In many of the larger cities, as in Boston, Cambridge, Providence, and New Haven, the English and the Latin schools are differentiated in organization. In others, both the English and the Latin courses are taken in the same building under the same principal, as in Chicago and Springfield; or under different principals, as in Lynn. The courses of study and their organization differ from ours chiefly in their flexibility (their "electives" and "options"), the smaller amount of work taken by a pupil both each day and during a session; and, in our judgment, the short time in which the studies are "completed." One of the leading educationalists I met told me that a sufficient course in Algebra, for example, was provided for a high school pupil if he had it the first and the fourth year of his course. He was amazed when I explained our programme. The want of continuity of the subjects in many schools is probably the worst defect of their organization. There can be no doubt whatever that even the best schools

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are much behind our average school in what we consider thoroughness. The Boston scheme of study shows fewer of the peculiarities of the American system than most of the others I know of; and, as it will prove very suggestive to the Ontario educationist, I give it here: the sanity and naturalness of the prescribed methods are much to be commended. Graduates of the Grammar Schools (from the ninth grade) are admitted to the English and the Latin High Schools without examination. Other pupils may be admitted to the Latin Schools who are at least eleven years old and have passed an examination equivalent to that required for admission to the seventh grade of the Grammar Schools (about our senior fourth form).

COURSES OF STUDY: BOSTON HIGH SCHOOLS.

Latin High Schools.

The Latin Schools are to be in session five hours a day for five days of the week. Of the five hours a day, a quarter of an hour is assigned to the opening exercises, and half an hour to recesses. The average length of an "hour" for class exercises or for study is about fifty minutes. Of the twenty-five school "hours" in a week, twenty hours are to be given to class exercises, and five hours—one each day—to study. The study hour and the recitation or exercise hour may be divided into two or more periods, according to the needs of the pupils and the exigencies of the programme.

Pupils will not be required to make preparation for more than fifteen lessons or exercises a week. Members of the three lower classes will be required to study out of school not more than ten hours a week; and members of the upper classes, not more than twelve hours a week.

The regular course of study is for six years. But pupils that have been graduated from a grammar school or have substantially done the whole or a part of the work of the lowest class or classes, may enter a higher class. Pupils, too, whose health and scholarship are good, may complete the regular course of study in less than six years. For good reasons pupils may spend more than six years in completing the course of studies, or may omit one or more studies of the course.

The Board of Supervisors grants diplomas to pupils that have completed the course of study, and certificates of proficiency to such as have completed a part of the course.

The number in brackets after a subject is the number of "hours" given it a week.

Class VI. (Lowest.)

English (6).—1. Reading aloud or silently (a) Hawthorne's Wonder Book and True Stories; (b) either Tom Brown's School Days at Rugby or Charles and Mary Lamb's Tales from Shakespeare; (c) some lives of persons famous in American history and descriptions of its important events.

2. (a) Reading aloud, committing to memory and reciting prose selections from standard authors and some of Whittier's and Longfellow's poems. (b) Exercises for cultivating clear and distinct utterance in speaking, reading, and reciting.

3. (a) Oral and written reproductions or abstracts of the history and of other reading lessons. (b) Oral and written descriptions of visits to historic places, buildings and monuments in and about Boston. (c) Conversations and written exercises on good morals and good manners.

4. (a) The analysis of sentences; the classification of words as parts of speech; changes in the form of words; and principles of syntax. (b) Penmanship; and exercises in copying, in writing from dictation and in reproduction for the purpose of training in correct spelling, punctuation, and forms of written compositions.

Note 1: (a) Teachers should recommend for home reading suitable books that may be taken from the school or from the Public Library. (b) Pieces should be committed to memory and recited, not chiefly for the purpose of "declamation,"—however valuable that may be,—but for the purpose of filling the mind with good thoughts and beautiful and noble sentiments, and of expressing these in a clear and distinct voice and in a simple and suitable manner. (c) Nearly every oral or written exercise of the school gives an opportunity for teaching English.

Latin: (5). 1. Regular forms, with simple exercises illustrating their use.

2. (a) Oral and written translation of easy Latin into English. (b) Unprepared translation of easy Latin with the help of the teacher.

3. (a) Reading aloud, copying and writing from dictation, Latin simple in construction and composed of words familiar to the pupils. (b) Simple oral and written translation of English into Latin.

Note 2: Beginners in Latin should hear much easy Latin read and translated and should read aloud the same or similar passages and translate them into English so that Latin words, the changes in their forms, and the force of these changes may become familiar. A few Latin words should be added, each day, to the vocabulary of the pupils.

History: *See English.* (a) Reading lives of persons famous in American history and descriptions of its important events; and making oral or written reproductions or abstracts of the same. (b) Oral and written descriptions of visits to historic places, buildings and monuments in and about Boston.

Note 3: The reading of history lessons should be accompanied and followed by collateral reading and by conversations upon prominent and interesting events. There should be, of course, no attempt to load the memory with unimportant facts and dates. The main purposes should be (1) to train the pupils to grasp mentally the leading events in their order, and (2) to induce or arouse an interest in historical reading.

Note 4: If the teacher of history be not also the teacher of English, they will form together such a plan of work as will economize the time of each.

Geography: (2) Physical and political geography of (a) the United States; (b) the countries of Europe; (c) the remaining countries of North America.

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ELEMENTARY SCIENCE: (½) Physiology and hygiene.

NOTE 5: The requirements of the law are to be observed as to teaching "the effects of alcoholic drinks, stimulants and narcotics on the human system."

NOTE 6: The time in the year for beginning or closing a study may be determined by the principal; but the class must give to each the study the aggregate time prescribed.

MATHEMATICS: (4½) 1. Arithmetic: (4) Oral exercises with simple numbers, arithmetic at sight, and written arithmetic: (a) Reviews of Grammar School work. (b) The metric system. (c) Percentage, and its applications to commission, profit and loss, and other simple subjects, and to simple interest.
2. Observational geometry: (½).

NOTE 7: Pupils are to observe, measure and represent solids, surface, and lines, and to infer, express, and use simple geometrical truths.
PHYSICAL TRAINING AND SINGING: (2) Gymnastics and singing, for girls. Gymnastics, for boys.

CLASS V.

ENGLISH: (6) 1. Reading aloud or silently (a) Hawthorne's Tanglewood Tales; (b) either Kingsley's Greek Heroes or selections from Scott's Tales of a Grandfather; (c) some lives of persons famous in English history and descriptions of its important events.
2. (a) Reading aloud, committing to memory, and reciting prose selections from standard authors, and some of Holmes's, Bryant's, and parts of Scott's poems. (b) Exercises for cultivating clear, distinct, forcible, and expressive utterance in speaking, reading, and reciting.
3. (a) Oral and written reproductions or abstracts of the history and of other reading lessons. (b) Conversations and written exercises on good morals and good manners.
4. (a) Analysis of sentences; inflections of words and principles of syntax. (b) Penmanship; exercises in writing from dictation and in reproduction for the purpose of training in spelling, punctuation, and forms of written composition. (See Note 1, under Class VI.)

LATIN: (5) 1. Forms and constructions with exercises thereon.
2. Oral and, occasionally, written translation into idiomatic English (a) of easy Latin and (b) at least of Books I., II., and III. of Cæsar's Gallic War. (c) Unprepared translation of easy Latin.
3. (a) Reading aloud, copying, and writing from dictation, familiar passages from Cæsar. (b) Repeating aloud or writing passages from Cæsar that have been carefully studied and committed to memory.
4. English into Latin, including simple oral and written exercises based upon passages from Cæsar. (See Note 2, under Class VI.)

HISTORY: *See English.* Reading lives of persons famous in English history and descriptions of its important events; and making oral and written reproductions or abstracts of the same. (See notes 3 and 4 under class VI.)
GEOGRAPHY: (2½). 1. Physical and political geography, with map-drawing of (a) the countries of South America; (b) the West Indies, etc.; (c) the countries of Asia and of Africa; (d) Australia, Malaysia, and other islands of the Pacific.
2. Physical and astronomical geography.
3. Reviews.

ELEMENTARY SCIENCE: (½). Botany, inductively studied.

NOTE: The time in a year for beginning or closing a study may be determined by the principal; but the class must give to each study the aggregate time prescribed.

MATHEMATICS: (4). 1. Arithmetic (3½). Oral exercises with simple numbers, arithmetic at sight, and written arithmetic: (a) Application of the principles of percentage to bank discount, partial payments, and compound interest. (b) Compound numbers, with simple practical problems. (c) Ratio and proportion. (d) Powers: square root and its common applications, cube root with simple practical problems. (e) The algebraic expression of the generalizations of arithmetic and the solution of simple algebraic equations expressing arithmetical facts or truths.
2. Geometry: (½). Observational geometry, including the mensuration of parallelogram, triangle, trapezoid, trapezium, circle and any other plane figure divisible into triangles; of the right prism, pyramid, cylinder and cone; and of the sphere. (See Note 7, under Class VI.)

PHYSICAL TRAINING AND SINGING. (2). As in Class VI.

CLASS IV.

ENGLISH: (5). 1. Reading aloud or silently (a) Irving's Sketch Book; (b) Church's Stories of the Old World; and (c) Plutarch's Lives of Famous Greeks. (d) Reading descriptions of and studying the great events in the history of ancient Greece. (e) Reading astronomical and physical geography.
2. (a) Reading aloud, committing to memory, and reciting prose selections from standard authors, and some of Lowell's, Gray's and parts of Goldsmith's poems. (b) Exercises for cultivating clear, distinct, forcible and expressive utterance in speaking, reading and reciting.
3. (a) Oral and written reproductions or abstracts of lectures of historical, geographical, and other readings. (b) Compositions—chiefly narratives and descriptions. (c) Applications of the principles of good English to the correction of mistakes made by the pupils in speaking and writing.

NOTE 1: The pupils are now old enough to begin to appreciate literature as such. The purpose and spirit of the author and the merits of his thought and style should be pointed out. His defects should be but lightly touched.

FRENCH OR GERMAN: (3½). (a) Translating into English, reading aloud, and, immediately after the teacher, repeating aloud, easy French or German. (b) Simple exercises in pronunciation and conversation based on this French or German. (c) Unprepared translation of easy French or German into English.
2. (a) Oral and written practice in the forms and use of nouns, pronouns, adjectives, articles, regular verbs, and at least twenty irregular verbs.
3. Simple oral and written translations of English into French or German.

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NOTE 2: Pupils should, with the help of the teacher, read, at the outset, French or German, and translate it into English. They should be trained to observe forms and idioms and the force of these, and thus should acquire some real knowledge of the foreign language before they begin to study its formal grammar.

LATIN: (5). 1. Oral and, occasionally, written translation, at least, (a) of Books IV. and V. of Cæsar's Gallic War; (b) of 1,000 lines of Ovid; and (c) of Book I. and a part of Book II. of the Æneid. (d) Unprepared translation of average passages from Cæsar and of the easier passages from Ovid.

2. (a) Writing from dictation and committing to memory, passages from Cæsar. (b) Reading metrically and committing to memory passages from Ovid.

3. English into Latin, including oral and written exercises based upon passages from Cæsar or upon other Latin prose that the pupils have translated into English.

NOTE 3: Pupils should be induced to translate much Latin into English. To this end the teacher should occasionally translate and comment upon the more difficult passages; should cause the brighter pupils to translate at sight average passages, and the average pupils to translate at sight the easier passages, and should skilfully remove the difficulties that obstruct the way of the duller pupils.

NOTE 4: In March, the study of Greek may be begun; but the time it takes from other studies of Class IV. should be restored to the same studies of Class III.

HISTORY: *See English.* Reading Plutarch's Lives of Famous Greeks; reading descriptions of and studying the great events in the history of ancient Greece; and making oral and written reproductions or abstracts of the same.

NOTE 5: Pupils in Class IV. are old enough to begin to appreciate causes and consequences of historical events and to form clear conceptions of the life of the people whose history they are reading. Teachers should use statuary, paintings, engravings, photographs, and other available historic illustrations (at the Art Museum and elsewhere), and should read to the pupils, or cause them to read, such extracts from standard historical writers as distinctly and vividly portray famous men and events.

ELEMENTARY SCIENCE: ½ (a) Botany, inductively studied. (b) Physiology and hygiene.

NOTE 6: The time in the year for beginning or closing a study may be determined by the principal; but the class must give to each study the aggregate time prescribed.

MATHEMATICS: 4. Algebra, including (a) generalizations of arithmetic and of observational geometry, and (b) the solution of equations expressing arithmetical and simple geometrical facts and truths.

PHYSICAL TRAINING AND SINGING: 2. Details as in Class VI.

CLASS III.

ENGLISH: (5) 1. Reading aloud or silently (a) Addison's papers in the Spectator; (b) one of Scott's novels; (c) Plutarch's Lives of Famous Romans; and (d) Macaulay's Lays of AncientRome; (e) Reading descriptions of and studying the great events in the history of ancient Rome.

2. (a) Reading aloud, committing to memory and reciting prose selections from standard authors, and either some poems of Tennyson, Emerson and Wordsworth, or a part of the English and American poems whose study is required for admission to college. (See under Class II.) (b) Exercises for cultivating clear, distinct, forcible and expressive utterance in speaking, reading and reciting.

3. (a) Oral and written reproductions or abstracts of lectures and of the history and other reading lessons. (b) Compositions. (c) Some study of English as used by the best authors; and exercises for training pupils to correct their own mistakes in speaking and writing. (See Note 1, under Class IV.)

FRENCH OR GERMAN: (2) 1. (a) Reading aloud and translating into idiomatic English, French or German suited to the progress of the class. (b) Simple exercises in conversation based on this French or German (c) Unprepared translation of easy French or German into English.

2. Forms reviewed and irregular forms studied, with exercises thereon.

3. (a) Writing from dictation or from memory French or German containing only familiar words and forms and common constructions. (b) Simple oral and written translations of English into French or German, including exercises based upon passages already translated into English.

NOTE 1: (See Note 2, under Class IV.) Most of the time assigned this year to French or German should be used by the pupils in reading the foreign language and translating it into English. Occasionally there should be practice in getting thoughts directly from the French or German without translating it into English.

LATIN: (4). 1. Oral and, occasionally, written translation (a) of the remainder of Book II., and the whole of Books III., IV. and V. of the Æneid; (b) of Sallust's Catiline; and (c) of, at least, one of Nepos's Lives. (d) Unprepared translation of average passages from Cæsar and of the easier passages from Sallust, Nepos, and Vergil.

(2) (a) Writing from dictation and committing to memory passages from Sallust or Nepos. (b) Reading metrically and committing to memory passages from Vergil.

3. English into Latin, including oral and written exercises based upon passages from Cæsar, Sallust or Nepos. (See Note 3, under Class IV.)

GREEK: (5) 1. Forms and constructions with simple exercises illustrating their use.

2. (a) Oral and written translation of easy Greek into English. (b) Oral translation of, at least, a part of Book I. of the Anabasis, or of easy passages from any other work of Xenophon. (c) Unprepared translation of easy Greek, with the help of the teacher.

3. (a) Reading aloud, copying and writing from dictation Greek simple in construction and composed of words familiar to the pupils. (b) Simple oral and written translation of English into Attic Greece, including exercises based upon passages from Book I. of the Anabasis or from any other work of Xenophon that the pupils have begun to translate into English.

NOTE 2: That pupils may, early in the course, acquire some knowledge of the Greek language as a foundation for their study of its formal grammar, they should read aloud and should hear the teacher read much connected Greek, and should, with his help, translate it into English. They would thus gradually learn, through ear and eye, changes in the forms of words and, through the understanding, the force of these changes; and, at the same time, interested in the connected narrative, would gain daily in the power of translating readily Greek into English.

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HISTORY: *See English.* Reading Plutarch's Lives of Famous Romans, and Macaulay's Lays of Ancient Rome; reading descriptions of and studying the great events in the history of ancient Rome; and making oral and written reproductions or abstracts of the same. (See note 5, under Class IV).

MATHEMATICS: Algebra; review of arithmetic and of observational geometry; applications of algebra to arithmetic and to the elements of geometry.

NOTE 3: With the aid of algebra, Class III. can thoroughly study some arithmetical subjects—*e. g.*, powers and roots—that were only lightly touched in the lower classes. Near the close of this school-year, the final examination in Arithmetic should be given.

PHYSICAL TRAINING AND SINGING: (2) As in Class VI.

CLASS II.

ENGLISH: (4). I. Reading aloud or silently and studying (*a*), at least, one play of Shakespeare; and (*b*) a part of the English literature required for admission to college. (*c*) Reading descriptions of and studying the great events in the history of ancient Greece and Rome.

2. (*a*) Committing to memory and reciting selections from standard authors of prose and poetry. (*b*) Exercises for cultivating correct and expressive utterance.

3. (*a*) Oral and written reproductions or abstracts of lectures and of the history and other reading lessons. (*b*) Compositions. (*c*) Some critical study of standard English prose as to correctness, perspicuity, and force; and exercise for training pupils to correct their own mistakes in speaking and writing.

NOTE 1: The course of study in English literature for Classes 1. and II. is largely determined by the requirements for admission to New England colleges. These requirements in English literature for the years 1901-1905 are given below. Of course, the authors there mentioned should be mainly studied for their literature. If the pupils will but read with a genuine interest and with a fair appreciation of thought and sentiment, not only will their standard of reading and thinking be raised and their literary taste improved, but also their ability to use good English will be increased. Merits rather than defects in the exercises used for improving style of expression should be emphasized. Indeed, if pupils do not violate the principles of good use, they will not need to correct the solecisms and barbarisms of others; and if, on the other hand, they use bad English, it will be sufficient for them to correct their own mistakes and blunders.

1901 and 1902. Shakespeare's Merchant of Venice; Pope's Iliad, Books I., VI., XXII., and XXIV. The Sir Roger de Coverley Papers in the Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; Scott's Ivanhoe; Cooper's Last of the Mohicans; Tennyson's Princess; Lowell's Vision of Sir Launfal; George Elliot's Silas Marner; Shakespeare's Macbeth; Milton's Lycidas, Comus, L'Allegro, and Il Penseroso; Burke's speech on Conciliation with America; Macaulay's Essays on Milton and Addison.

1903, 1904, and 1905. Shakespeare's Merchant of Venice; Shakespeare's Julius Cæsar; The Sir Roger de Coverley Papers in the Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; Scott's Ivanhoe; Carlyle's Essay on Burns; Tennyson's Princess; Lowell's Vision of Sir Launfal; George Eliot's Silas Marner; Shakespeare's Macbeth; Milton's Lycidas, Comus, L'Allegro, and Il Penseroso; Burke's Speech on Conciliation with America; Macaulay's Essays on Milton and Addison.

FRENCH OR GERMAN: (2) 1. (*a*) Reading aloud, without translating into English, some easy French or German prose. (*b*) Conversations based on this French or German. (*c*) Reproduction of stories or of other simple French or German heard or read by the pupils.

2. (*a*) Oral and written translations into idiomatic English of some modern French or German prose and poetry suited to the progress of the class; also, if time permit, of one or more French or German classics. (*b*) Unprepared translations of easy and average passages from French or German into English.

3. (*a*) Study of irregular forms and unfamiliar constructions, with exercises thereon. (*b*) Translation of English into French, including oral and written exercises based upon passages selected from the authors studied.

NOTE 2: The French or German read this year should be mainly nineteenth century prose, and should include not only fiction but also biography and history.

(1) To translate readily French or German into idiomatic English, and (2) to acquire and appreciate the author's thoughts through *reading* the foreign language without *translating* it into English, are the two main objects of its study in the Latin Schools. While accomplishing these objects, the pupils should acquire a correct pronunciation and a familiarity with forms and syntax, and should begin to compose and converse in the foreign language.

LATIN: (4) 1. Oral and, occasionally, written translation (*a*) of, at least, three more books of the Æneid and the Eclogues of Virgil; (*b*) of, at least, four orations of Cicero; and (*c*) of some of Nepos's Lives. (*d*) Unprepared translation of average passages from Cæsar and Nepos, and of the easier passages from Vergil and Cicero.

2. (*a*) Writing from dictation and committing to memory passages from the prose writers studied; and (*b*) reading metrically and committing to memory passages from Vergil.

3. English into Latin, including oral and written exercises based upon passages from Cæsar, Nepos, or Cicero. (See Note 3, under Class IV.)

GREEK: (5) 1. Forms, constructions, and idioms, with exercises thereon.

2. (*a*) Oral and written translations into idiomatic English of, at least, Books I.-IV. of the Anabasis or its equivalent. (*b*) Unprepared translation of simple Attic prose. (*c*) Reading aloud, writing from dictation, and committing to memory familiar passages from Greek.

3. English into Greek, including oral and written exercises based upon passages from Attic prose. (See Note 2, under Class III.)

HISTORY: *See English.* Reading descriptions of and studying the great events in the history of ancient Greece and Rome; and making oral and written reproductions or abstracts of the same. (See Note 5, under Class IV.)

MATHEMATICS: (3) (*a*) Algebra through quadratic equations. (*b*) Plane geometry, begun.

PHYSICAL TRAINING AND SINGING: (2) As in Class VI.

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CLASS I.

ENGLISH: (2) 1. (a) Reading aloud or silently and studying the English literature required for admission to college. (b) Oral and written abstracts and interpretations of a part of the works read or studied.

2. (a) Committing to memory and reciting selections from standard authors of prose and poetry. (b) Exercises for cultivating correct and expressive utterance.

3. (a) Compositions. (b) Some critical study of standard English prose as to correctness, propriety, perspicuity, and force; and exercises for training pupils to correct their own mistakes in speaking and writing. (See Note 1, under Class II.)

LATIN: (4) 1. Prepared and unprepared translation, oral and written, from Vergil and Cicero.

2. (a) Writing from dictation and committing to memory passages from Cicero; and (b) reading metrically and committing to memory passages from Vergil.

3. English into Latin, including oral and written exercises based upon passages from Nepos, Cæsar, or Cicero. (See Note 3, under Class IV.)

NOTE 1: The productions of Latin and Greek authors should now be read and interpreted as literature. However valuable the study of Latin and Greek grammar may be made, it should be kept strictly subordinated to the study of the Latin and Greek literature read.

GREEK: (4½) 1. Translations from Attic prose and from Homer, including unprepared translations of average and easier passages.

2. Reading metrically and committing to memory passages from Homer.

3. English into Greek, including oral and written exercises based upon passages from Attic prose. (See Note 1, under Latin.

ELEMENTARY SCIENCE: (3½) Physics, studied inductively and experimentally.

NOTE 2.: The time in the year for beginning and closing a study may be determined by the principal; but the class must give to each study the aggregate time prescribed.

MATHEMATICS: (4). Either plane geometry, completed; or plane geometry, completed, and solid geometry, studied.

NOTE 3: A part of the regular work in geometry should be original demonstrations of theorems and applications of geometrical truths in the solution of problems.

PHYSICAL TRAINING AND SINGING: (5), as in Class VI.

NOTE 4: To meet the special needs of some pupils, they will be allowed—if the circumstances of the school permit and the head-master consent -(a) to substitute the history of the United States and England for the history of Greece and Rome; (b) to substitute advanced French, or advanced physics, or advanced algebra together with logarithms and trigonometry, for advanced Greek; (c) to substitute in the boys' school elementary German for that part of advanced Latin or advanced Greek studied by Class I; and (d) to "anticipate" studies of the Freshman year.

GIRLS' LATIN SCHOOL.

COURSE OF STUDY IN ELEMENTARY AND ADVANCED GERMAN.

NOTE 1: The course of study in elementary and advanced German may be taken by pupils in the Girls' Latin School instead of the course in elementary and advanced Greek.

CLASS III.

ELEMENTARY GERMAN: (5.) 1. (a) Translating into English, reading aloud, and, immediately after the teacher, repeating aloud, easy German. (b) Simple exercises in pronunciation and conversation based on this German. (c) Unprepared translation of easy German into English. (d) Committing to memory and reciting German poetry.

2. Oral and written practice in the forms and use of nouns, pronouns, adjectives, articles, regular verbs, and all the common irregular verbs, and in the construction of easy sentences.

3. (a) Writing German from dictation or from memory. (b) Simple oral and written translation of English into German.

NOTE 2: Pupils should, at the outset, read German with the help of the teacher, and translate it into English. They should be trained to observe forms and idioms and the force of these; and thus should acquire some real knowledge of the German language before they begin to study its formal grammar.

CLASS II.

ELEMENTARY GERMAN: (5.) 1. (a) Reading aloud and translating into idiomatic English German suited to the progress of the class. (b) Sight translation of German into English. (c) Simple exercises conducted in German on what has been translated at sight into English. (d) Committing to memory and reciting German poetry.

2. The review of forms and the study of irregular verbs and of constructions, continued, with exercises thereon.

3. (a) Oral and written reproduction of stories or of other simple German heard or read by the pupils. (b) Oral or written translation of English into German.

NOTE 3. The German read this year should be mainly nineteenth century prose, and should include biography and history, as well as fiction. The German language is, whenever it is practicable, to be used in the class-room.

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CLASS I.

ADVANCED GERMAN: (4½.) 1. (*a*) Translating into idiomatic English German prose and poetry suited to the progress of the class, including two or more German classics. (*b*) Sight translation of German into English. (*c*) Committing to memory and reciting German poetry. (*d*) Reading aloud, without translating into English, German prose of ordinary difficulty. (*e*) Conversation in German.

2. Review of German grammar, a German text-book in grammar to be used, and the recitations to be conducted in German.

3. Free composition in German, including composition on subjects drawn from German books previously read.

NOTE 4: (1) To translate readily German into idiomatic English, and (2) to acquire and appreciate the author's thoughts through *reading* the German without *translating* it into English, are the two main objects of its study in the Latin Schools. While accomplishing these objects, the pupils should acquire the correct pronunciation of German and become familiar with its forms and syntax, and should, at the close of the third year of study, be well started in German conversation and composition.

ENGLISH HIGH SCHOOLS.

The general provisions are the same as for the Latin Schools, with the following modifications:—

If pupils are unable, from ill-health or for other reasons, to pursue in full the regular course of study, or if the interests of pupils require them to omit a part of the course, the principal may allow such pupils to pursue partial courses of study, and to continue them from year to year; but diplomas of graduation cannot be awarded pupils until they have completed the regular course of study.

FIRST YEAR.

ENGLISH: *Four hours a week till March 1; one hour a week after March 1.* English Language and Literature.

HISTORY: (2). Ancient History.

FOREIGN LANGUAGE (See Note 1): (4 or 5) French, German or Latin.

MATHEMATICS: *Either five or four hours a week till March 1; either four or three hours a week after March 1.* Algebra, with generalizations of Arithmetic.

SCIENCE: *Four hours a week after March 1.* Botany.

DRAWING: (2).

MUSIC (See Note 2): (1). Singing.

PHYSICAL TRAINING: (2). Gymnastics for girls. Gymnastics and Military Drill for boys.

NOTE 1: The choice of a study must be subject to the approval of the principal.

NOTE 2: Pupils excused from singing must do additional work in some other study of the regular course.

SECOND YEAR.

ENGLISH: (3). English Language and Literature.

HISTORY: (2). Mediæval History. Modern History begun.

FOREIGN LANGUAGE: (3 or 4). French, German or Latin continued.

MATHEMATICS: (3 or 4). Plane Geometry.

SCIENCE (See Note 1): (3). Zoology; followed by a short course in Physiology and Hygiene.

DRAWING: (2).

MUSIC (See Note 2): (1). Singing.

PHYSICAL TRAINING: (2). Gymnastics for girls. Gymnastics and Military Drill for boys.

ELECTIVES (See Note 3): Elective substitute for Zoology: Book-keeping, including Commercial Arithmetic.

NOTE 1: Pupils intending to enter the Normal School are advised to study Zoology.

NOTE 2: Pupils excused from singing must do additional work in some other study of the regular course.

NOTE 3: The choice of a study must be subject to the approval of the principal.

THIRD YEAR.

ENGLISH: (3). English Language and Literature.

HISTORY AND CIVIL GOVERNMENT: (3). Modern History. Civil Government.

FOREIGN LANGUAGE (See Note 1): (3). Either (*a*) French, German or Latin continued, or (*b*) French or German begun.

MATHEMATICS: (2). Algebra and Plane Geometry completed.

SCIENCE: (6). Physics, three hours. Chemistry, three hours.

MUSIC (See Note 2): (1). Singing.

PHYSICAL TRAINING: (2). Gymnastics for girls. Gymnastics and Military Drill for boys.

ELECTIVES (See Note 1): Elective substitute for Foreign Language: Phonography. Elective substitute for Mathematics: Drawing.

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NOTE 1: The choice of a study, and changes in the choice of a foreign language, must be subject to the approval of the principal.

NOTE 2: Pupils excused from singing must do additional work in some other study of the regular course.

FOURTH YEAR.

REQUIRED ENGLISH: (3). Rhetoric and Composition.

MUSIC (See Note 1): (1) Singing.

GYMNASTICS: (2).

ELECTIVES. (see Note 2): (12). English Literature; History; French; German; Latin; Advanced Algebra, Solid Geometry, Plane Trigonometry with application to Surveying and Navigation, Analytic Geometry; Physics, Chemistry, Astronomy (See Note 3); Drawing; Phonography.

NOTE 1: Pupils excused from singing must do additional work in some other study of the regular course.

NOTE 2: The choice of studies must be subject to the approval of the principal.

NOTE 3: Pupils intending to enter the Normal School are advised to study Astronomy.

NUMBER OF HOURS A WEEK TO BE GIVEN TO THE SEVERAL ELECTIVE STUDIES OF THE FOURTH-YEAR CLASS.

ENGLISH LITERATURE: Either 1 hour or 2 hours a week. This time is in addition to the 3 hours a week given to required "Rhetoric and Composition."

HISTORY: (2).

FOREIGN LANGUAGES: (3 or 4 each). Credit in hours to be given to only two of the three foreign languages.

MATHEMATICS: Advanced Algebra, (2); Solid Geometry, (2); Plane Trigonometry with applications to Surveying and Navigation, (2); Analytic Geometry, (2). Credit in hours to be given to only three of the four branches of Mathematics.

SCIENCES: Physics, (3); Chemistry, (3); Astronomy, (3). Credit in hours to be given to only two of the three Sciences.

DRAWING: (2).

PHONOGRAPHY: 3 hours a week, for pupils beginning the study; 2 hours a week for pupils continuing the study.

HIGH SCHOOL COMMERCIAL COURSE.

FIRST YEAR.

ENGLISH: *Four hours a week till March* 1; *one hour a week after March* 1. English Language and Literature.

HISTORY: (2). Ancient History.

PHONOGRAPHY, PENMANSHIP, AND COMMERCIAL FORMS: (4 or 5).

COMMERCIAL ARITHMETIC AND BOOKKEEPING BEGUN: *Either five or four hours a week till March 1; either four or three hours a week after March 1.*

SCIENCE: *Four hours a week after March 1.* Botany.

DRAWING: (2).

MUSIC (See Note 1): (1). Singing.

PHYSICAL TRAINING: (2). Gymnastics for girls. Gymnastics and Military Drill for boys.

NOTE 1: Pupils excused from singing must do additional work in some other study of the course,

SECOND YEAR.

ENGLISH: (3). English Language and Literature.

HISTORY: (2). Mediæval History, (2). Modern History.

PHONOGRAPHY, TYPEWRITING, AND ELEMENTS OF MERCANTILE LAW: (3 or 4).

BOOKKEEPING AND COMMERCIAL GEOGRAPHY: (3 or 4).

SCIENCE: (3). Zoology; followed by a short course in Physiology and Hygiene.

DRAWING: (2).

MUSIC (See Note 1): (1). Singing.

PHYSICAL TRAINING: (2). Gymnastics for girls. Gymnastics and Military Drill for boys.

NOTE 1: Pupils excused from singing must do additional work in some other study of the course.

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GENERAL CONSIDERATIONS.

Public and School Libraries.

A few matters of a general nature need to be considered in connection with the subjects I have been discussing:

In 1899, this Province spent $56,769.77 in books, and $11,045.60 in magazines and periodicals for its public libraries. Of this amount, the Legislature gave $44,748.97. Let us consider, in this connection, the following facts also contained in the Educational Report for 1899. There are 5,120 rural public schools and 204 rural separate schools, outside of the schools in the cities, towns, and incorporated villages. In 30 of these municipalities, there are no public libraries, while outside of them there are only 196; that is, there are over 5,000 rural school sections which the public library does not reach, and which, so far as I can find out, have few, if any, libraries of any kind. I have already shewn how important it is that a taste for good literature should be cultivated in all our schools, in the Public Schools in particular, where the large body of our people receive their education. Is our library system as effective as it can be made? I doubt it very much; and I have two suggestions to offer for its improvement:

(1) Where Public Schools now exist, the Library Boards should co-operate with the School Boards, and their teachers. The good librarian knows much about books and something about children; the good teacher knows much about children and something about books. In many of the U.S. cities and towns I visited, special provision is made in the Public Libraries for the wants of both pupils and teachers. Books suitable for them are bought, and arrangements made for their distribution. Selected sets, often to the number of two or three hundred volumes, classified for the different grades and consisting of 20 or 25 copies of each book, are sent at the beginning of a term to the Grammar and the High School. As soon as one set is read, it is replaced by another, at the request of the Principal; and the reading of such books in school and at home, under the teacher's guidance, is made a prominent feature of the course. Teachers also have special privileges, being allowed to take out from half a dozen to a dozen or so at a time. Another illustration may be given of this system of co-operation. In Belleville (Ill.), the State Superintendent tells me, some years ago, under the direction of the Superintendent of Schools, every teacher read a given number of books, classified them for the school grades, and reported to a committee appointed to group them. Lists were then printed on large cards which were placed in the library for the use of the children. New book lists are posted in the same way. At the approach of national days like Washington's and Lincoln's birthday, Memorial day and others, when the older pupils are assigned themes or questions for debate, the teachers give the librarians the subject, and the books treating of them are placed upon the inspection table for their use. Moreover, the teachers' own pedagogical library has been placed in a separate case in the library and is cared for by the librarian. A room in the library is also set apart for the use of the teachers.

(2) The travelling library scheme which is to come into operation this year in Ontario, admits, I believe, of a very desirable extension.

Each Public School Inspector's district should have a central library suitable for the teachers and pupils of the rural schools, under the charge and management of the Inspector. The books could be distributed by him from time to time amongst the different schools of his inspectorate, and, in this way, the public libraries, what Carlyle calls "*the* University," could be brought to every fireside. The system of exchange would make its value a maximum one If the Legislature gave an annual grant for this purpose, supplemented by at least an equal amount from the county, an inestimable boon would be conferred on the rural districts. Such provision would, of course, only supplement the reference libraries which we hope to see some day in every Public and Separate School in the Province. I venture here to express the opinion—in which I believe many concur—that the general interests would not suffer if the amount of money for this purpose, say $10,000 a year, were diverted from the present grant to Mechanics' Institutes.

School Boards and their Powers.

As I have already pointed out, one of the evils resulting from the competition amongst schools is the attempt often made to undertake work for which the staff is in-

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adequate. The tendency is reinforced by the very natural desire on the part of even the smallest district to provide, itself, for all its educational wants. This is especially noticeable in the case of the two masters' and some three masters' High Schools. Here, again, we may learn from what is done in Massachusetts. There every centre of five hundred families and over must maintain a High School; but, when such centres cannot give a full curriculum, they must pay for pupils requiring advanced subjects, not only the tuition fees at another suitable centre, but the cost of transportation as well. The same obligation rests upon towns with a smaller population. Our High School Boards should, I think, be given the same power. Competition and natural local pride might for a time prevent them from using it, but such a provision would afford a relief, in the case of pupils requiring technical or Form V. work. The following is an extreme case, it is true, but it illustrates the situation. A year or so ago, I inspected a High School with only one pupil in Form IV. and about forty in each of the lower forms. On the basis of the teachers' salaries alone, this one pupil cost $700, and the provision for the other pupils was quite insufficient. It would have been far better financially and educationally for all concerned had the locality paid this pupil's board bill and school fees at another school. Some principals, recognizing the situation, advise such pupils to go elsewhere; but, for evident reasons, the practice is not general. In this connection I may note also as a proof of the paramount importance attached to education by the people of Massachusetts, that last year a law was passed compelling street railways (which are very numerous in the state) to charge not more than half fare for the transportation of school children, whether such children reside in the city or town or any other city or town.

Here and there in this report I have spoken of the necessity for co-operation on the part of all the bodies connected with education—the Public School, the High School, and the Mechanics Institute (or the Free Library) Boards. We have Boards of Education in many parts of the Province; but, notwithstanding the fact that High and Public school Boards may amalgamate, few have availed themselves of the provision. The objection to union usually comes from the High School side. The trustees feel—often, I believe, without sufficient grounds—that, being in the minority, they might not be able to protect the interests they especially represent. No provision yet exists for union with the Mechanics Institute Boards—a provision which seems to be necessary if the libraries are to be the important factor in education they should be, and if technical evening classes are to be established and efficiently maintained. The separation of the School Boards is the survival of the theory which once existed, but which has now pretty nearly disappeared, that the Public School is for the lower and poorer classes and the High for the upper and richer. Owing to the genesis of the High School it would undoubtedly have been unsafe in the then temper of the people to risk the future of the secondary schools by entrusting it to the direct control of the masses. But the situation is now different.

In my judgment, the consolidation of the Boards could be more easily brought about if the law provided for the substitution therefor of a Board of Education composed of members partly nominated as at present and partly elected by the people at large. The ward system has serious evils; and, though now and then unsuitable members are found on the High School Boards, there are very few localities in which any but the best are appointed. Most of the Boards in the United States are, it is true, elected by the people at large, but by no means all of them. The principle of nomination to secure the presence of desirable members who would represent special educational interests or who would not submit to the ordeal of an election, is often fully recognized; and I found the general opinion to be, even in the home of democracy, that a School Board should be partly nominated and partly elected by the citizens at large. If the change proposed is too radical a one the school trustees might be given representation on the Mechanics Institute Boards. The existence of separate Technical School Boards will only add to the complexity of our system.

Free High Schools.

When the late Chief Superintendent changed the name of our primary schools from "common" to "public," he did it for wise reasons. But the name "public" has turned out, I think, to be an unfortunate one; for it has tended to perpetuate

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the theory that the Public Schools are for the general public and the High Schools for a richer class. In the United States all the schools—primary, grammar, and high—are now called Public Schools; and they *are* Public Schools, for all are the schools of the people, always with free tuition and often with free text-books. The High School there is as much the people's care as the Grammar School, and each city or town vies with its neighbor in ministering generously and munificently to the requirements of both.

How is it with us in Ontario? Of our 130 High Schools and Collegiate Institutes, 46 are free to residents and 18 are free to all; 33 which charge fees, charge none in Form I. to residents, and the average annual charge of those which charge fees for Form I. is $8.29; 24 of them charging less than $10.00. The time has not yet come, unfortunately, when all our High Schools can be made free by law. No one, however, who studies the history of educational movements can doubt that we shall eventually follow the example of the Republic to the south of us. Even on the low ground of economic expediency the course will be a necessary one; for we cannot otherwise compete successfully with the rival at our doors.

Probably the first step would be to make Form I. free by law. The difficulty that now exists here and there in adjusting to each other the High and the Public School system would then disappear.

I have now discussed the amendments that seem to me to be desirable in our course of study and in the associated subjects of departmental control. Even if my proposals meet with the approval of the Education Department, they cannot all be carried out at once. Any changes should be made gradually, and after due notice, so that all concerned—boards, teachers, and the general public—may prepare themselves for new conditions.

In Part I. I have dealt with some of the excellences of the American systems and in Part II. with some of the defects of our own. I did not concern myself especially with the defects of the American systems, nor have I deemed it necessary to expatiate on the excellences of our own. But to any one who has even a slight knowledge of the American schools, their main defects are evident—their excessive recognition of the principle of "Electives," the chance for the faddist to implement his schemes, and the lack of continuity in their courses and of thoroughness as we understand the term in Ontario. And I desire further to record my opinion that a proper combination of local and state control is most to be desired, that our type of High School teacher is not surpassed by the best I saw during my visit, and that the best products of the Ontario High Schools are in academic attainments the superiors and in intellectual capacity at the least the equals f the best products of the American systems.

ERRATA.

On page 252, Table I., for "271" read "471."
" 252, " II., for "1828" read "1378."

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ARCHÆOLOGICAL REPORT

1900.

BEING PART OF

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MINISTER OF EDUCATION

ONTARIO.

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ARCHÆOLOGICAL REPORT.

HONOURABLE RICHARD HARCOURT, M. A., Q. C.,

Minister of Education.

SIR,—Partly owing to pressure of indoor duty, and partly on account of absence from the city for a time, little or nothing has been done during the year in the way of original work. The Laidlaw collection has been re arranged in wall cases on a plan different from the one adopted hitherto in the museum, and it is particularly pleasing to note that this arrangement is quite satisfactory to Mr. Laidlaw, the generous donor. All the specimens, (some fifteen hundred) are placed in groups, each of which represents one of the thirty-one village sites examined by the collector. Thus arranged, one can see at a glance what may be called an object picture representing in some measure the every day life of those who occupied the Balsam Lake district, and as this life did not differ very much from that of other aborigines in this province, the grouping will thus answer a general purpose. It is not, however, intended to change the arrangement of all the other specimens in conformity with this method, for each plan possesses advantages. It is not only necessary to have two systems of arrangement, but several times as many, when the quantity of material and space for display make such disposition possible.

The collection procured from Mr. J. S. Heath, formerly of Brantford, has been kept together as representative of an area comprising many sites of the Neutrals in what is now Brant county. In this collection all the objects that are similar in kind form distinct groups (as in the museum at large) but these being side by side illustrate conditions as they existed over the whole district examined.

In last report there was a preliminary account of the Mexican collection presented by Mrs. Wm. Stuart, from the pen of that lady herself. Since then, the specimens, numbering 274, have been received and placed beside similar material from more northerly points in Mexico. In addition to this gift, Mrs. Stuart has kindly placed on loan, 43 objects from the same locality as are those that form her gift, viz., the Isthmus of Tehuantepec.

An effort was made by correspondence with some of the officers and men connected with our contingents in the African service, looking towards the securing of native weapons, tools, and other ethnological articles, but so far the result seems to be almost barren, with the exception of a few brought to us by Mr. Frederick Hamilton, the Toronto *Globe* Correspondent.

When, with your consent, an opportunity was afforded last summer to visit several of the best ethnological and archæological collections in Europe, it was hoped that much would be gleaned in the shape of information respecting labels, cases, arrangement and classification of specimens, and cataloguing. This hope was realized only in part. So far as cases are concerned we have much to learn, and much which even if we knew we would fear to imitate owing to the extreme cost we should have to incur by so-doing. In European museums thousands of pounds are spent in cases of modern patterns to

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secure not only elegance and commodiousness, but absolute freedom from dust and moths. So far as labels, arrangement and classification are concerned little was seen that could suggest any improvement on our own methods, and it may not be immodest to state that the Ontario Archæological Museum did not suffer much by comparison even with the collection in the British Museum. Ethnologically, however, we are far behind. In London, Liverpool, and Paris more especially, there are magnificent collections, enabling students to compare the trend of thought and the process of development in science, as well as in art, among peoples in every stage of growth.

It is true that hitherto the main object in Ontario has been the study of primitive conditions as exemplified by its own original inhabitants, and although there is yet an immense field to be covered at home, the contents of our cases are now such as to require at least fairly good and typically representative material for comparative purposes from other lands.

The little that has already been done in this way is largely the result of appeals made by the curator for gratuitous contributions, in connection with which thanks are due to public spirited men like the Rev. Dr. Annand of the New Hebrides, the Rev. Dr. MacLean of Neepawa, Manitoba, Prof. G. S. Ramsay of California, and to such generously disposed ladies as Mrs. John Currie and Mrs. Wm. Stuart of this city, all of whom have made valuable additions to the museum. But while we may expect gifts from time to time, it is too much to look forward to the possibility of making the museum what it ought to be in a province like Ontario without the expenditure of more money than has hitherto been available. A public museum to be efficient requires as much support as a library, if not more. For a dollar or two one can buy a scientific book, or an art book, in which reference may be made to material wholly beyond the reader's reach, even if not beyond his means, or, what is even more probable, the objects he wishes to see may be so rare and so valuable that he can never hope to possess anything of the kind. Casts and models are always desirable—sometimes they are preferable to originals, e.g., as in human heads illustrating racial types, or methods of tattooing, and these are procurable only for cash. A museum like ours ought to have a large number of such casts, whereas there is not one. The student should have an opportunity to compare the crania of numerous divisions of our race, but those of distinct peoples can be got by purchase only, unless some fortunate opportunity occur to effect an exchange.

All the case-room in the museum is occupied, and many of the cases, especially those on tables are not only out of keeping with the other fittings of the rooms, but are unsafe receptacles for valuable articles. Should we acquire even the average number of specimens during the following year, it will be difficult to find room without crowding what is already installed.

It cannot be repeated too often that a museum is no place for what is merely curious. Apart from educational value no object is worthy of room in any collection except it be in a collection of bric-a-brac. Curiosities, as such, have a value only when they serve to illustrate some departure from natural law

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or from well-established popular custom. On the other hand, as Prof. E. S. Morse has said, "'What seems a worthless object to the minds of the multitude becomes at once endowed with interest when carefully framed or mounted, and clearly labeled."

Mr. F. T. Mott, one of a British Association Committee on the museums of the United Kingdom, has written, "Museums, free libraries and art galleries have this in common; that they are each expected to fulfil two purposes which are somewhat incongruous, and require to be pursued by different methods and with different appliances. Each of these institutions is expected to minister to the wants both of trained students and of an untrained and ignorant public; and the demands of these two classes of persons are so diverse that they must be provided for separately. The free library must have its lending department for the general public, and its reference department for students. The art gallery must have attractive and interesting pictures for ordinary visitors, but it must also have masterly studies for the instruction of young artists. The museum, however, has a still more difficult and complex part to play. It has not only to provide for the diverse wants of students and of visitors. but it has also to contribute to the general progress of scientific knowledge. Every museum . . . which is a public and in some sense a national institution, has a three-fold duty: (1) to the nation at large, (2) to the students of the neighborhood, and (3) to the local public. If museums are ever going to be more than a confused compound of the curiosity shop and the peep-show, which is what very many of them are at present, this three-fold purpose must be very clearly recognized, and means must be found for the efficient carrying on of each department." Quoted by Prof. Morse in U. S. National Report for 1893. P. 777.

There are now upwards of twenty-two thousand specimens in our cases illustrative mainly of American archæology and ethnology, and of them, by far the greater number are from our own province.

As soon as possible the contents of the two rooms should be re-arranged so as to place the ethnological material in one and the archæological in the other. Perhaps it would be a good time to effect this change before the replacement of the specimens about to be exhibited at the Pan-American Exposition in Buffalo.

I have the honor to be

Your respectfully,

DAVID BOYLE.

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ACCESSIONS TO THE MUSEUM.

21,768. Small and gracefully formed stone pipe, from W. C. Perry, Winnipeg.
21,769. Piece of Tasso's oak. Geo. Vair, Toronto.
21,770. Cast of bird amulet. Sec. 3, Oneida tp., Eaton Co., Mich., U.S.A.; C. V. Fuller, Lansing, Mich.
21,771. Bird amulet (cast). Watertown tp., Clinton Co., Mich., U. S. A. C. V. Fuller, Lansing, Mich.
21,772. Bird amulet (cast). Sec. 3, Oneida tp., Eaton Co., Mich., U.S.A. C. V. Fuller, Lansing, Mich.
21,773. Bird amulet (cast), Eagle tp., Clinton Co., 1 mile north, Sec. 3. C. V. Fuller, Lansing.
21,774. Bird amulet (cast). Eagle tp., Clinton Co., 1 mile north-west of Sec. 3, Oneida tp. C. V. Fuller, Lansing.
21,775. Small model of dug-out cedar canoe, made by a Mississauga boy, Patton tp., Algoma. Mr. S. James.
21,776. Eskimo dog-whip, bought by Mr. G. Boucher, at Ungava Bay, Labrador, and presented by John H. Burnham, Peterboro.
21,777. Maple-sap skimmer. Ojibwa, Manitoulin Is. Made by a native for Mr. F. W. Waugh, 1899.

MRS. STUART'S COLLECTION.

21,778 9. Two fan-shaped pieces of sheet or thin copper. Union Hidalgo, about 20 miles from San Geronimo, Mexico.
21,780. Clay olla. Found near San Geronimo, Mex., in 1895.
21,781. Clay olla (shoe shaped), Chuichitan, Mex.
21,782 Olla, apparently of cement, " "
21,783. Ollita, round—red clay, " "
21,784. Ollita, white clay with hollow handle, Chuichitan, Mex.
21,785. Small ollita-like clay amulet, San Geronimo, Mex.
21,786. Large human clay head, Ixtaltepec, Mex.
21,787. Small and rudely formed clay figure. Short legs. From Chuichitan, Mex.
21,788. Monkey's head, clay, Ixtaltepec, Mex.
21,789. Image head, clay, flat behind, part broken off, Mex.
21,790. Small red image of woman, clay, broken off at waist, Mex.
21,791. Image head, clay, Mex.
21,792. Large sized, red clay head, Mex.
21,793. Little pendant figure, hole at top of head, arms and legs broken off. Chuichitan, Mex.
21,794. Greyish white head, clay. Two holes at neck, Mex.
21,795. Head in red clay, Mex.
21,796. Fox's head in white clay, Mex.
21,797. Body of image, clay, Mex.
21,798. Head and chest of image, found at San Geronimo, Mex.
21,799. Rhinoceros-looking head, clay, Union Hidalgo, Mex.

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21,800. Head and chest of image, like a rabbit, clay, Chuichitan, Mex.
21,801. Head of image—pot adornment. Union Hidalgo, Mex.
21,802. Head of image—very dark colour, with long cap. Found at San Geronimo, Mex.
21,803. Clay Image, partly broken, San Geronimo, Mex.
21,804. Clay chest of image with necklace, Mex.
21,805. Head in red clay, Mex.
21,806. Negro-like head, with neck, San Geronimo, Mex.
21,807. Red clay head, with necklace, " "
21,808. Small perfect red clay image, " "
21,809. Small head and chest of image, clay, San Geronimo, Mex.
21,810. Bird's head (Zopilote), San Geronimo, Mex.
21,811. Image, head of woman, red clay, San Geronimo, Mex.
21,812. Figure of dog (?) clay, Union Hidalgo, Mex.
21,813. Child's rattle in grey clay, Chuichitan, Mex.
21,814. Monkey head, possibly a pipe bowl, Union Hidalgo, Mex.
21,815. Head, pot ornament, found at San Geronimo, Mex.
21,816. Little quartz (?) image, bought in " "
21,817. Perfect little head, with neck, clay, Union Hidalgo, Mex.
21,818. Similar style of head, neck broken, clay, " "
21,819. Negro type of head, clay, Union Hidalgo, Mex.
21,820. Supposed to be a rattle or whistle, San Geronimo.
21,821. Pendant, found on surface beside large mound.
21,822. Small hand, clay, San Geronimo, Mex.
21,823. Fragment of large clay face.
21,824. Painted olla, San Geronimo, Mex.
21,825. Pipe stem, or dish handle, Union Hidalgo, Mex.
21,826. Pipe stem (small), or dish handle, " "
21,827. Stamp or seal, clay, Ixtaltepec, Mex.
21,828. " " " "
21,829. " " San Geronimo, Mex.
21,830. " " " "
21,831. " " " "
21,832. Clay article, cylindrical, probably a stamp, Miss Elsie Stuart.
21,833. Olla ornament, clay, San Geronimo, Mex.
21,834. Pot leg, clay, " "
21,835. " " " "
21,836. " " " "
21,837. " " " "
21,838. " " " "
21,839. " ornament—clay, " "
21,840. " " " " "
21,841. Stone hammer, found on surface in a wild place full of brush, San Geronimo, Mex.
21,842. Stone hammer, found on surface in a wild place full of brush, San Geronimo, Mex.

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21,843. Broken axe, San Geronimo, Mex.
21,844. Stone pestle, " "
21,845. Smoothing stone, " "
21,846. Stone axe, Union Hidalgo, "
21,847. " " "
21,848. Axe, San Geronimo, "
21,849. Small stone axe, San Geronimo, Mex.
21,850. Stone axe, " "
21,851. Copper axe, Union Hidalgo, Mex.
21,852. Stone chisel, San Geronimo, "
21,853. Broken chisel, " "
21,854. Tip of flint (?) chisel, San Geronimo, Mex.
21,855. Number of obsidian articles, San Geronimo, Mex.
21,856. Smoothing stone (?) " "
21,857. " " " "
21,858. " " " "
21,859. Fragments of chalcedony, San Pablo, Mex.
21,860. Clay bowl, shallow, imperfect, San Geronimo, Mex.
21,861. Number of sinker (?) balls, " "
21,862. Five beads or balls, Ixtaltepec, Mex.
21,863. Beads (?) San Geronimo, Mex.
21,864. Two spindle whorls (?). "
21,865. Pumice stone—Isthmus of Tehuantepec.
21,866. Coral—2 old pieces, broken off large blocks used with blocks of stone, in building old Fort at Coatzacoalcos on Isthmus.
21,867. Indigo from Isthmus.
21,868. Tamarinds.
21,869. Large seed pod (?), San Geronimo, Mexico.
21,870. Red seeds and pods, " "
21,871. Specimens of Isthmus coffee.
21,872. Bottle containing two snakes.
21,873. " " Tarantula, Scorpion, etc.
21,874. " " Cast skin of snake.
21,875. Tiny nest of unknown bird.
21,876. Two nests of Golden Oriole, San Geronimo, Mex.
21,877. Butterflies, Insects.

(21,866–21,877: Transferred to the Biological Section.)

21,878. Various small clay articles found at San Geronimo.
21,879. Stone beads or pendants.
21,880. Black clay head " "

21,881. Bird amulet, lot 18, Culross tp., Bruce Co., R. McDonald.
21,882. Small olla (with long nosed grotesque face), Mexico, Dr. Fuzier, Paris, France.

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21,883. Clay vessels, somewhat imperfect, found by Emerson Grobb in crevice on the face of the "Mountain," lot 10, con. 5, Clinton, tp., Lincoln Co. Presented by T. W. Moyer, Campden.

21,884. Silver finger ring.

21,885. Pair of silver bracelets.

21,886. Silver earrings (colored glass settings).

21,886. " (plain).

21,887-22,015. Silver brooches.

From 21,884 to 22,015 formed heir-looms in a Tuscarora family (Carryer) on the Grand River Reserve, Ont., and were purchased from Miss Emily Carryer.

22,016. Cast of elephant pipe found near Davenport, Iowa, John H. Hume.

22,017. Small three-barbed harpoon (bone), lot 13, con. 2, York E. E. A James, Thornhill.

22,018. Model of Iroquois cradle, Six Nation Reserve, Grand River, Ont., Miss Emily Carryer.

22,019. Slate slick stone, engraved with human figure and zig-zag lines, Roebuck, Augusta tp., Grenville Co., Ont, A. S. Gerald, Prescott.

22,020. Soapstone pipe, Spencerville, Edwardsburg tp., Grenville Co., A. S. Gerald.

22 021. Soapstone pipe, Roebuck, Augusta tp., Grenville Co , A. S Gerald.

22,022. Huronian slate tube, North shore, Charleston Lake, Escott tp., Leeds Co , Arthur Brown, Pub. Sch. Insp., Morrisburg.

22,023. Clay pipe, Roebuck, Augusta tp., Grenville Co., Ont., A. S. Gerald, Prescott.

22,024-6. Three bone needle cases, Ungava Bay, Labrador, A. S. Gerald, Prescott.

22027. Toggle harpoon head, Ungava Bay, Labrador, A. S. Gerald.

22028. Bear's tooth, large, perforated on each edge, Labrador, A. S Gerald.

22029. Stone axe or adze, side flat, found in a gravel pit near Thamesford, Arnold Payne, Thamesford.

22030. Rubbing stone, Hudson R. shale, Spencerville, Edwardsburg tp., Grenville Co., A. S. Gerald.

22031. Wooden cup, Indian grave, Roebuck, Augusta tp., A. S. Gerald, Grenville Co.

22032. Pestle, Vernon village, one of only two found in Okanogan Valley, B.O., W. C. Perry, Winnipeg.

22033. Pestle Spence's bridge, Thompson R., B.C., Mr. Ogle, per W. C. Perry, Winnipeg.

22034. Handle of pestle, Kamloops, Indian burying ground, junction of N. & S., Thompson Rivers surface, W. C. Perry, Winnipeg.

22035. Stone pipe, large, carved by Indian Jim of Ft. McLeod, Alta., W. C. Perry, Win.

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22036. Model of steamer "William IV.," built at Gananoque in 1832. From the estate of Mrs. Henrietta McDonald, widow of the late Hon. John McDonald, one of the steamer's owner's. Per Judge Herbert S. McDonald, Brockville.

22037. Stick (notched) with shell beads sent as an invitation to attend the New Year's Feast and burning of the White Dog at Seneca Long-house, Grand River Reserve on Feb. 7 and 8, 1900.

22038. Soapstone pipe, lot 27, con. 6 Luther East. Found by Alex. Jas. Blair, Tarbert.

22039. Bird amulet, found by Mr. Broderick and Mr. Anderson while dredging the Morrisburg Canal. Per J. A. Jackson, M.A.

22040-5. Six small arrow heads, Medicine Hat, N. W. Territory. Per W. C. Perry, Win.

22046. Pestle (very fine and perfect) Knob Hill, Comox, British Columbia, John B. Boyle, Phœnix, Brit. Col.

22047. Chain (cast solid—loose links) made at meeting of British Assoc., Bradford, 1900, to show the Malayan method of performing such work.

22048. Fifty fragments of pipe stems and parts of bowls. Walker and Sealey farms, Brantford township.

22049. Fifteen fragments showing rude attempts at pottery making. Walker and Sealey farms.

22050. Thirty-one human teeth. Kitchen middens, Brant County.

22051. Two bear's teeth. Kitchen midden, Brant County.

22,052. Teeth of beaver, squirrel, etc. Kitchen middens, Brant Co.

22,053. Beaver teeth, and three jaws of small animals. Kitchen middens, Walker & Sealey farms.

22,054. Bear's jaw and teeth. Kitchen middens, Walker & Sealey farms.

22,055. Twenty-one pieces of deer horn. Kitchen middens, Walker & Sealey farms.

22,056. Bone beads and fragments of deer horn. Kitchen midden, Walker & Sealey farms.

22,057. Five pieces of unworked deer horn. Kitchen middens, Walker & Sealey farms.

22,058. Fragments of antlers from various places in Brant county.

22,059. Miscellaneous antlers from various places in Brant county.

22,060. Human jaw. Sealey farm, Brantford township.

22,061. Fish hook of bone and iron. Peel and MacKenzie Rivers, N.W.T. Rev. Chas. E. Whittaker.

22,062. Maple knot bowl, presented to Mrs. Phillip Sovereign, of Bronte, Ontario, by Captain Joseph Brant. Mrs. Sovereign gave it to her daughter, Mrs. Fitzpatrick, who in turn gave it to her daughter Anna, now Mrs. John McNab, who presented it to the museum per her son, Mr. Donald G. McNab.

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22,063. Large, well-made, slightly grooved stone axe, lot 29, con. 3, West York. Donald G. McNab.

22,064. Chief's iron pipe tomahawk, lot 28, con. 3, West York, Ont. Donald G. McNab.

22,065. Blanket or rug, spun and woven from mountain-goat hair by the Indians of Nanaimo, British Columbia. Dr. A. P. Coleman, professor of Geology and Mineralogy, School of Practical Science, Toronto.

22,066. Fragments of pottery, village site near Glenville, N.Y. P. M. VanEpps and Louis Albrand.

22,067. Grass, used by natives of Hawaii for ornamenting their dresses.

22,068. Arrowhead, Stony Island Avenue, opposite 63rd street, World's Fair Grounds. David Boyle.

22,069. Copper punch (?) Oshkosh, Wis. Mrs. Kate Culver, Springfield, Ill.

22,070. Squash seeds, Cliff Dwellings, Dirty Devil river, Wayne Co., Utah. Don Maguire.

22,071. Arrowhead, Cliff Dwellings, San Juan river, Utah. Don Maguire.

22,072. Scraper, Cliff Dwellings, San Juan river, Utah. Don Maguire.

22,073. Fragments of pottery, San Juan river, Utah. Don Maguire.

22,074. Beans from sealed vase, San Juan river, Utah. Don Maguire.

22,075. Corn cobs, San Juan river, Utah. Don Maguire.

22,076. Set of playing cards, Southern China. Rev. Mr. Westervelt, Chicago.

22,077. Fish spines, used as needles, village site, Solid Comfort Camp, Port Colborne.

22,078. Wampum beads (11), Brant County. F. Christie, Brantford.

22,079. Leaf shaped arrowhead, Pilkington t'p, Wellington County. David Boyle.

22,080. Rough or unfinished chert tool, Pilkington t'p, Wellington County. David Boyle.

22,081. Small flint tool, Pilkington t'p, Wellington County. David Boyle.

22,082. Beaver's jaws, village site, Smithdale, Simcoe County. G. Lougheed.

22,083. Modern iron arrowhead, Sioux, Dakota.

22,084. Peculiarly grooved axe, Fairfield t'p, Shiawassee County, Michigan. P. F. VanDeusen, Garland, Michigan.

22,085. Slightly grooved axe, Fairfield t'p, Shiawassee county, Michigan. P. F. VanDeusen.

22,086. Axe, medium plain, Fairfield t'p, Shiawassee county, Michigan. P. F. VanDeusen.

22,087. Axe, large, plain, Fairfield t'p, Shiawassee county, Michigan. P. F. VanDeusen.

22,088. Axe, wide, small, Fairfield t'p, Shiawassee county, Michigan. P. F. VanDeusen.

22,089. Arrowhead, Fairfield t'p, Shiawassee county, Michigan. P. F. VanDeusen.

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22,090. Gorget, Fairfield t'p, Shiawassee County, Michigan. P. F. Van-Deusen.

22,091. Tapa Cloth, Society Islands. David Boyle.

22,092. Nephrite pebble sawn by natives for tool-making, Port Hammond, British Columbia. J. C. Ross, Gore Bay, Manitoulin Island.

22,093. Stone pestle, Port Hammond, British Columbia. J. C. Ross, Gore Bay, Manitoulin Island.

22,094. Copper axe or chisel, McKellar t'p, Parry Sound. J. M. Ansley, St. Catherines, per Miss Elizabeth Ansley.

22,095. Curved chert scraper, lot 10, con. 5, North Dorchester. B. F. Sharpe.

22,096-9. Arrowheads, lot 27, con. C, Scarboro' t'p. Robert Martin, Scarboro'.

22,100-2. Three fine arrowheads, Rondeau Point, Kent County. W. Jull.

22,103 6. Four flints, Rondeau Point, Kent County. W. Jull.

22,107-8. Bracelets of copper or brass wire (wire said to be of native make) coiled round a core of horsehair, Baralong village, (Basuto) near Toba Mountain, Orange River Colony. Pattern common, but not distinctively tribal. Lieut. Frederick Hamilton, Globe correspondent.

22,109. (Basuto) nosecleaner, used now only by old people, attached to brass blanket-pin of native make of European material, and ornamented with European beads. Got from an old woman twenty miles north of Sand River, Orange River Colony. Lieut. Frederick Hamilton.

22,110. Powder horn, Basutoland native make, from body of Basuto Chief Moirosse after a battle in South Africa. Mr. Saunders per Lieut. Frederick Hamilton.

22,111. Snuff-box used by one of the Basuto tribe of Negroes. Mr. Sanders per Lieut. Frederick Hamilton.

22,112-13. Strainers, used by the Basutos in making native beer. Lieut. Frederick Hamilton, Globe correspondent.

22,114. Snuff box made from a small gourd. Lieut. Federick Hamilton, Globe correspondent.

22,115. Horns corresponding to service medals, a horn for each big fight, worn by the C'unquaauns, a Zulu branch, near Delagoa, South Africa. Lieut. Frederick Hamilton, Globe correspondent.

22,116. Private purse (wooden) Zulu. S. Africa

22,117. Human mask from clay pipe. Found near south shore of Lake Simcoe, York County. David Boyle.

22,118. One stemless catlinite pipe, from a Cree at Portage la Prairie, Man.

22,119. One stem catlinite pipe, from a Sioux, at Portage la Prairie, Man.

22,120. Religious offering used in connection with dances, Rolling River, n. w. of Minnedosa, Man., at foot of sun-dance pole.

22,121-2. Two bead-work moccasin flaps,, Portage la Prairie, found near a tent in an Indian village (Sioux).

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22,123. Stone hammer, grooved, water-worn stone. South shore Lake Manitoba, Man.

22,124. Model of sun-dance pole, etc.

From 22,118-24 are the gifts of Harry Laidlaw, Esq., 36 Fuller street, Toronto.

22,125. Zulu girl's dress (Basuto) Vet River, South Africa. Lieut. Fred. Hamilton.

22,126. Seven bone, claw-like beads, on a string of horse-hair, Basuto. Lt. Fred. Hamilton.

22,127. String of 7 shells and 7 wooden beads (very large). Lieut. Fred Hamilton.

22,128. Bangle bracelet of blue beads, Basuto. Lieut. Fred. Hamilton.

22,129. Horn comb, five prongs, incised decoration, Zulu. Lieut. Fred. Hamilton.

NOTES.

Primitive man was only deficient—not absolutely defective in originality. Somewhere among the folds of his brain there was that which, in at least a small degree, incited to originality or novelty in the form, adaptation and ornamentation of his weapons, tools and utensils. His conservatism was rather of a generic than of a specific character. All his hammers, axes and arrowheads of stone—all his needles or awls, fishhooks and harpoons of bone and horn, all his stone and clay vessels were true as to type, while occasionally varying very much in matters of detail. Such variation was, no doubt, often merely the result of accident, or exigency. The cleavage and fracture of stones and bones were not always along desired lines, and for this reason the workman had to adapt his ideas in some measure to the form of his crude material. Nothing can be more certain than that such unintentional modifications sometimes proved highly advantageous, in which case, attempts would subsequently be made to imitate them. Apart from this, however, there is just as little doubt that the aboriginal worker actually devised improved forms, and, in course of time, invented new tools. On any other supposition progress was impossible, and it is therefore a mere truism to say that the degree of a people's advancement in civilization marks the degree of that people's originative and adaptive ability, for what holds good in this way with respect to handicrafts is true also in matters of government, as well as every in other relation of life.

It would, however, be manifestly unfair to judge wholly with respect to a people's mentality simply by the standard of mechanical contrivances as exemplified by those in common use. Yet, we often find opinions regarding primitive conditions of society, formed thus, superficially. The very closest and keenest examination may fail to reveal to us the use or purpose of an artifact, and even when this is known, as in the case of say, a hammer, or a spear-head, we are yet totally in the dark respecting numerous expedients and

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devices in which such an object may have been employed, utterly foreign to the original purpose. A hammer-stone, for example, may have been used temporarily as a sinker, as a target, as a missile, as a prop, as a wedge or in some game; and we may never guess how many mechanical expedients involved the use of celts, gouges, chisels, and tools of bone and horn. We shall never know to what extent the lever was employed, if employed at all otherwise than as a paddle, or as a brace; and we must remain in ignorance respecting many aboriginal devices connected with everyday occupations.

But after making every reasonable allowance, we cannot fail to be struck with the fact that notwithstanding so much apparently possible progressiveness our aborigines did not apply much of their knowlege in such way as would have tended to make life more enjoyable, or at any rate more tolerable. Of inventiveness, in our sense, they had no knowledge, or they would have devised many plans to ease their labors simple as these were. American Indians everywhere, made disks of clay and of stone for use in games and as spindle-whorls. They even pierced some of these with a central hole which might have suggested an axle, yet they never hit upon the idea of constructing even the simplest form of a wheeled vehicle. They must frequently have seen the effect of fire on metalliferous stone, but it was not until the European came that North Amerian Indians (not including the ancient Mexicans) attempted to melt a metal. Smelting has never been attempted by them. In this respect, as in some others, they were behind several African tribes which not only possessed the art of smelting, but had among them many persons who could fabricate tools, weapons and ornaments from the iron and copper thus produced. Our Indian was well acquainted with the patterns produced on clay vessels by means of twisted strings and basket-work, but he got no nearer to the stamp thus suggested than to use a bone or a reed sometimes, for the purpose of incising small circles on his clay-vessels. Even this simple device, so far as Ontario is concerned, seems to have been employed only by the people who lived in Victoria county, as may be seen by a comparison of fragments in the Laidlaw collection with those from other places. In Mexico the art of stamping was well known, many of the stamps or seals being of elaborate designs, and on looking at these one wonders to think how near the ancient people of that country had come to the art of printing, and yet we know that the Chinese remained on a similar verge for centuries.

Perhaps the most signal failure on the part of Canadian and Northern United States Indians to take advantage of experience and circumstances to improve their condition is shown by their indisposition, or by their inability to better their dwellings. Disease and death consequent on exposure in rickety structures of bark and skins taught them no lesson. Wood and clay were everywhere abundant, and the making of a comparatively comfortable house would have involved much less work than the forming of a canoe, yet they continued to live in structures, which, at best, were little more than wind-breaks.

Judging from what we know, therefore, respecting the Indians in this part of the continent, at the date of discovery and since, it can scarcely be

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said that they were on the high road to civilization. Although it might be improper to characterize their mental state as one of arrested development, it was certainly a case in which development was very much retarded.

Compared with the Maoris and many African peoples, they have proved deficient in what may be called receptivity, while, if we place them side by side with the Black Fellows of Australia, we find the advantage in favor of the Indians.

Along certain lines, however, it is observable that here and there communities have made considerable progress. This is especially true where the art instinct is concerned—a fact which scarcely corresponds with what our unaided reason would lead us to conclude, for we are disposed to regard advancement in art and in civilization as being synchronous if not almost synonymous. Omitting for this purpose all reference to the Aztecs, we know that the pottery products of many southwestern localities were characterized by graceful, as well as diversified forms. Ornamentation was often effected by means of relief, which is greatly in advance of incision or depression for decorative purposes. Imitations of human and lower animal heads were not uncommon, and sometimes the bodies of fish and frogs were represented.* Neither were the vessels in question invariably made round-bottomed as in the north, for some are flattened, some are supplied with a basal collar, while a smaller number are provided with three feet; the best possible method to secure steadiness on an uneven surface.

The people who lived near the sources of native copper often introduced new shapes, and they ultimately adopted, if they did not invent the socket instead of the tine or tang for handle attachment. Besides this, they sometimes hammered out forms of a very unusual kind, the uses of which remain to us only as matters of surmise.

Among the northern tribes perhaps the greatest amount of originality was evinced by them in the making of their pipes, whether of clay or of stone. While a few forms maintained their ground, or were characteristic of specific periods as some writers claim, it is equally true that in a very large number of cases the pipe-makers seemed to aim at having something different from anything made before, the variations being connected mainly with the representations of animal life. The human face was a favored subject, and sometimes the whole body was attempted, although in a highly conventionalized form, which seldom varied very much.

The only conclusion we can arrive at with respect to this condition of things is that the Indians, like many other peoples, possessed the power of advancement only to a limited extent, and in a few directions, and that this power was possessed by only a few persons at a time. Why this should be so is more easily asked than answered. Among ourselves there are many

* Among some hundreds of clay pipe heads in our collection there is but one which, by stretch of imagination, may be regarded as imitative of vegetal life. It is perhaps meant to represent a bit of a branch or stem covered with knots or spines.

A few pieces of Pueblo pottery are ornamented with leaf patterns, and it may be mentioned that a small vase of red clay from Chimbote, Peru, has relief representations of heads of maize.

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individuals constituted after the manner of normal primitive man. Some we refer to as lazy, some slow, some as stupid, and some as old-fashioned, or conservative—all are atavistic in these respects.

The condition of civilized as compared with that of primitively-minded peoples differs mainly in respect of the fact that among the former there is an enormously greater tendency to adopt, to adapt, to assimilate and to originate.

In Peru and Mexico the progressive power was possessed in a considerably higher degree than elsewhere in America, but even among the natives of these countries the limit was a narrow one from our point of view, and it had probably been reached centuries before the discovery.

The Human Form in Indian Art.

It has already been mentioned that where the decorative and ornamental were concerned the Indians showed some tendency to advancement, and that evidence to this effect was most observable in the diverse forms of tobacco pipes. Omitting for the present purpose reference to all but those bearing representations of the human head or of the whole body, a comparison of the designs may be here made.

At the very outset it may be taken for granted that all such attempts at imitating the human features were of a very general kind ; in other words, the primitive artist did not aim at portraiture in the exact sense. If he did, his intentions have proved failures. Indeed, it would have been marvellous had he succeeded in giving individual expression to his work, for the ability so to do is one of the highest achievements in art. It is not improbable that he sometimes tried to represent a broken nose, a blind eye, a wry face, or some conspicuous arrangement of hair, but that was all. It cannot be said that he even caught the typical features or expression of his race. One often hears the remark made that such a face, in clay or in stone, is a "regular Indian one," but expressions of this kind are the result of fancy rather than of fact.

Early attempts at imitation of any kind are always of a very simple character and strongly resemble sometimes what, in course of time, we are pleased to call conventionalized forms, on the supposition that they have been so evolved for artistic purposes from correct representations of the objects in question, whereas the truth may be that they are simply examples of persistence from the dawn of art, through a few or through many stages of progress, yet they are none the less conventionalizations, although in a different sense.

The efforts of a kindergarten pupil, or of any untaught child, to "make a man" correspond in results to that of the savage who undertakes to produce a similar drawing, and whether we say in this, or in any other connection, that the savage is but a child, or the child a mere savage is quite immaterial. In either case we mean that there has not been developed more than the crudest ideas of comparison and proportion. It is inevitable that that there shall be a head, however unlike it may be to a head ; but necessary as

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we would also suppose arms and legs to be, we often find one or other pair of limbs omitted. When arms are supplied they may spring from any part of the body, should there be a body, and the legs may appear to proceed immediately from the head.

Miss McIntyre, Director of the Provincial Model Kindergarten School, and Miss Lilian Dent, Director of one of the city Kindergarten schools, have very courteously supplied me with a number of drawings made by boys and girls between four and five years of age. The only direction these pupils received was just to "draw a man," and some of the results are here reproduced.

Fig. 1, which represents two men, could scarcely be more simple. In *a* the legs proceed directly from the head (the artist himself said so), but in *b* there is a line marking off the body from the lower limbs; in neither case, however, have arms been provided.

In these respects Fig. 2 is no better, but we have eyes, nose and mouth given, and a hat.

Fig. 3, of the goblin type, has a body, but no arms, and no feet. Indeed feet are often neglected, although legs are given.

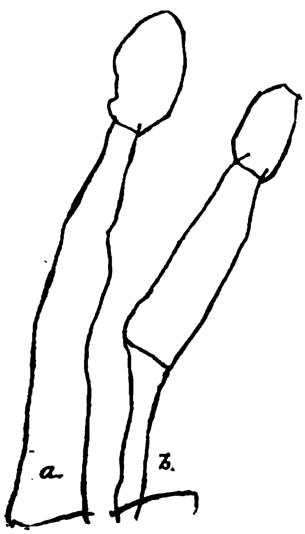

FIG. 1.

FIG. 2.

FIG. 3.

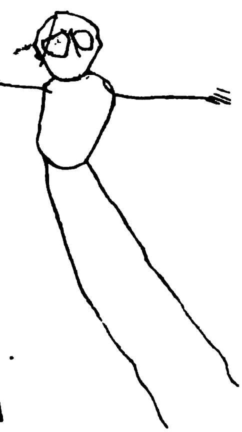

FIG. 4.

We have not only arms and legs in Fig. 4, and the former coming from the right part of the body, but there is no attempt to show feet, and only four fingers are shown on each hand. Eyes and nose appear in the face, but no mouth.

The young draughtsman of Fig. 5 aimed at some details. He supplies hair, and digits, but is short of the count on the feet. One of the most noticeable features here is that the arms spring from the head—a not uncommon thing in such drawings.

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Fig. 6, a pretentious attempt to depict a policeman (especially his buttons), is also apparently armless, but the artist assured his teacher that what

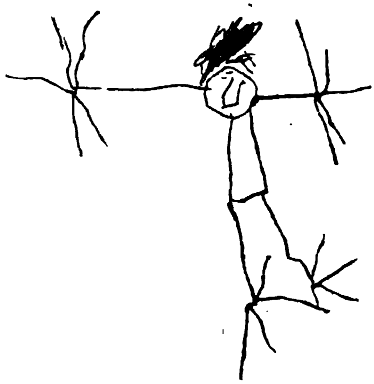

Fig. 5.

Fig. 6.

seems to be a pair of very unsymmetrical ears are really arms. Eyes, nose and mouth are shown, but the nose occupies a place above the eyes. The tuft below the mouth is a beard.

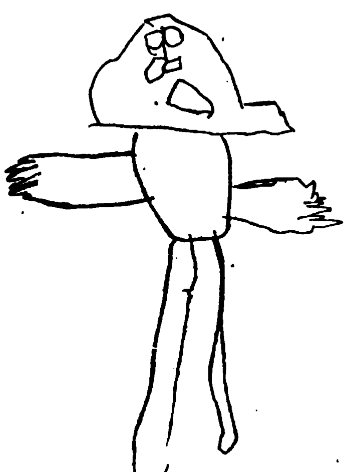

Fig. 7.

Fig. 8.

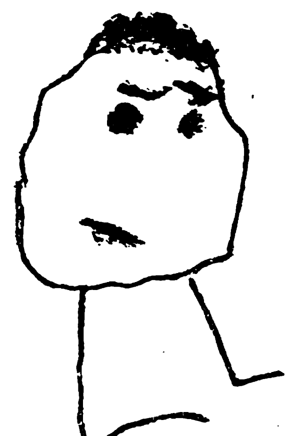

Fig. 9.

If Fig. 7 is not bold it is nothing. The face has all the chief features, however difficult it may be to identify them, and the arms occupy low positions on the body.

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Girls of the same age as the boys do no better. Fig. 8 is remarkable for its simplicity, and, like Figs. 9 and 10, has no body or arms. In Fig. 9 there is hair on the head, but no nose, unless what seem to be eyebrows are meant to represent a nose. Figs. 9 and 10 have feet.

The child who drew Fig. 11 had more in her mind than she could express, although she made the attempt. In the quadrangular head we may trace the main features, but very much out of place. The lines—one at each side of the head—are arms, while the portion of the drawing below, and to the left is meant for legs, which, in accordance with this conception, need not have any connection whatever with the body, or, rather with the head.

Fig. 12 is not so bad in many respects, but the most noticeable thing about it is the prominence given to the heels of the boots. Perhaps the child had an admiration for the high-heeled kind of foot-gear sometimes worn by ladies.

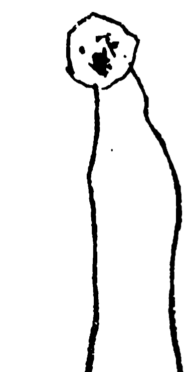

FIG. 10.

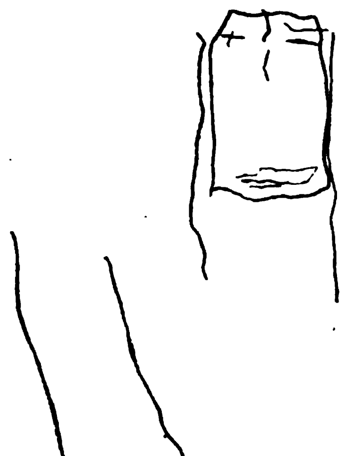

FIG. 11.

Fig. 13 is noteworthy on account of the attempt to bring out a full-face and side view at the same time, but the arms, as usual, are out of place. Still, this is the work of a child who has had considerable experience in drawing after her own style, as may be seen from the hat, the hair (conventionalized already), the eyebrows, and the shading of the legs.

A slight examination of these diagrams is sufficient to show the confusion of mind on the part of the children with respect to an object of which they have seen scores of examples daily, almost from the time of birth. It is to be observed that the head is never omitted, and Miss McIntyre informs me that this part is always drawn first. This corresponds with my own observation, where hundreds of children were concerned, but the placing of the features seems to puzzle the child-artist quite as much as the getting of the

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limbs where they ought to be. Only in one instance (Fig. 1) are the features wholly neglected. In no case is the face shown in profile which in after years becomes the favored method.

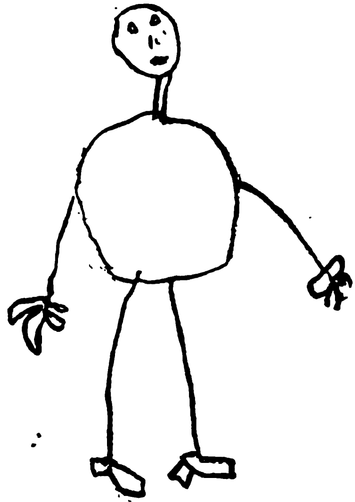

FIG. 12.

FIG. 13.

Notwithstanding the crudity that characterizes these drawings, it is undoubted that the children who made them were influenced more or less by pictures they had seen in books and elsewhere, and for this reason we may suppose the work to be all the better done.

It was intended to introduce here a few illustrations to show the resemblance that exists in many points between these and Indian drawings, but want of time must be urged as a plea for the omission. To those who are acquainted with aboriginal sketches of the human form this want will scarcely be observed, while, to those who are not it may simply be stated that many correspondences exist in both kinds of drawing.

THE HUMAN FACE IN CLAY.

In plastic representations of the human form, as well as in many of those produced in stone the Indian has worked more successfully. Numerous figures testifying to this fact have appeared in former reports, and the following series from the Laidlaw collection will more fully illustrate it:

Fig. 14—½ dia.

Rough in finish as is figure 14, it is very remarkable in several respects, perhaps the chief of which is the life-like character imported to it by the depression from the nostrils to the mouth. The eyes are mere hollows, rudely made, but the mouth is more carefully formed, showing both lips; and two holes not larger than if made by pin-points, indicate nostrils. This specimen was found on lot 5, con. 5, Bexley.

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Figure 15 is from the same farm, but totally different in treatment. The eyes have been made with a round-pointed tool, the nose is not sharply marked off from the cheeks, the nostrils are carelessly indicated, and the same may be said of the mouth which is only four upright indentations to suggest teeth. In this and the preceding cut the depression over the brow may have been meant to show how the hair was worn. In figure 14 a similar mark should have been somewhat deeper.

Fig. 15—½ dia.

Fig. 16—½ dia.

Rougher still than figure 15 is figure 16, yet bolder and more animated—more so than the small cut shows. Eyes and mouth are disproportionate, angular hollows, while what is meant for nostrils are punctures on the upper lip, quite as much out of place as if made by any child. Lot 12, con. 1, Fenelon township.

In figure 17 we have another example of child-like treatment. No attempt has been made to model a nose beyond making, the clay just a little higher in the middle and marking nostrils with a small pointed tool. As in figure 15 the mouth is shown by means of four upright depressions giving the effect of teeth. The eyes have been carefully made—a ridge surrounding a deep hollow in the middle of a shallower one. The back of the head terminates in a point, the whole posterior portion being a low cone. This also probably had reference to some fashion in hair-dressing. From lot 9, con. 3, Bexley township.

Fig. 17—½ dia.

Fig. 18—½ in dia.

An extremely expressive face is figured here. Like all the rest in this series it is from the bowl of a pipe, and from what remains of the bowl behind, the whole of this mask from the under edge of the eyes rose above the rest of the margin. In this specimen the eyes are modeled similarly to those in figure 17, and the same hair arrangement is shown as on figures 14 and 15. The mouth is only a depression without lips. The whole face is unusually round. From lot 18, Gull River Range, Bexley township.

Here again, the effort was simply to make a face which is really a much better one than the cut shows. Eyeballs are produced with some success, but lips and chin are failures as usual. There is, however, a slight depression between the nose and the brow.

Fig. 19—½ dia.

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Fig. 20—½ dia.

On the two faced pipe-bowl shown by figure 20 the faces are coarsely of the Greek type, and marked by deeply set eyes which here, as in many other specimens, are only depressions, and the same may be said of the mouths. No nostrils are indicated. There is evidently no attempt at portraiture any more than in the other cases, the only intention having been to make a face. Lot 9, con. 3, Bexley township.

Fig. 22—½ dia.

Uncommon as two faced pipes are, those having three are rarer still, and the style of art on this specimen is quite distinct from what we find on most other pipes of any kind. Three slight depressions in each case with a little elvation for the nose are all that go to form the faces, except the hollows for eyes and mouths. From lot 5, concession 5, Bexley township.

Fig. 22—½ dia.

The fragmentary pipe-bowl illustrated by figure 22 is given both on account of the simple human face designs it bears, and because it is the only specimen we have of a four-faced object of this kind. The faces are almost perfectly flat, except the T-shaped ridge that forms nose and forehead, the eyes and nose being simply depressions. Whether a pipe of this kind suggested what we call the Huron pipe, (having a square mouth, with a deep hollow at each angle) or the Huron pipe suggested this, is not easy to decide—perhaps it was neither way. The point to be considered here is the simplicity of the design representing the face. From lot 5, concession 5, Bexley township.

In imitating the human body the Indians were less successful whether the attempts were made by them in stone or in clay. Of any other substance there is little evidence that use was made in carving. Had bone been employed to any extent numerous specimens would have been found by this time. Rude patterns were often worked on bone combs, awl-handles, and the like, chiefly by means of straight lines and holes. Of such there are several examples in the museum, but we have only one specimen in this material, of the human figure probably the work of the Neutrals, as it was found on the farm of Mr. James Rae in the township of Beverly, Wentworth county. If such carvings were ever produced in wood we could hardly expect any traces of them to appear in our day, but it is not at all likely that we have lost much, or anything of this kind.

In clay-pipes a favorite design was that of a crouched or doubled-up human figure, in which the knees and elbows were brought together, the arms being represented in low relief extending to the face, which we always find with a long muzzle-like nose and mouth, and the head terminating in a blunt cone. Modifications of this occur, but they are rare, and never show any degree of advancement in the treatment of the body and limbs, although the head and face may be greatly superior. Only on one clay pipe has an attempt

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been made to show fingers, of which there are but three to each hand, and anything like even a distant imitation of feet is very unusual.

As with the child, the head is everything in primitive art, and as with the child, there is no attempt at portraiture.

Even among Mexican specimens, and they are numerous, it is not claimed that any of the big-nosed carvings in stone, or modelings in clay were ever intended to look like any body in particular so far as features are concerned.

Two Stone Pipes.

Fig. 23—½ dia.

The sandstone pipe bowl represented in this engraving is unique in design Nothing like this style of decoration exists on any other object of stone or clay in the museum. The lines are deeply cut, and with some approach to regularity. Powerfully imaginative observers profess to see something symbolic in the work—they think there must be some hidden meaning in the rectangular and triangular figures, but the same may be said of any other pattern we do not understand. In some respects this pipe-head seems to have been left unfinished. A small hole about one-fourth of an inch deep has been bored in the middle of the lower end as if to unite with another from one of the edges, but the latter has not been made.

It is from Bexley Township, and forms part of the Laidlaw collection.

Fig. 24—½ dia.

The crouched or seated position was the one usually chosen when the human figure was used as a pattern in pipe-making, no doubt partly because of its compressedness, and partly because the bowl could be more easily shaped from the rounded shoulders. Figure 24 is of mottled soapstone. The face and head could scarcely be more rudely formed, and it would be nearly as true to say the same of the limbs, the position of which v:ry but little from that of the sterotyped clay-pipe pattern. In this case, however, the arms rest across the knees, and the material has been cut to separate the lower part of the legs from the body of the stone. Fingers and toes there are none. Bexley Township, Laidlaw collection.

Pottery.

The fragmentary pot of which fig. 25 is a cut, was found by Mr. T. M. Robinson, of Gravenhurst, under a rocky cliff, near Severn Portage, on Muskoka Bay. Originally of graceful form, it is now chiefly valuable as an example of the method employed by the Indians in repairing fractures, or rather of the way in which a clay vessel was held together after being

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fractured—one or more holes having been bored on each side of the crack by means of which to bind the parts with a thong.

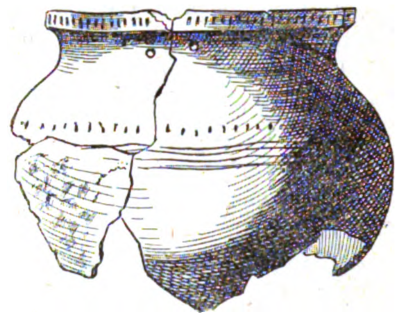

Fig. 25.

To our northern and nomadic Indians clay vessels must always have been highly valuable utensils, perhaps more so than any other article they used. It required special skill to produce them—the proper kind of material was not always at hand—much time was necessary to shape one—many of them must have been ruined during the burning process, and at all times they were liable to breakage.

This vessel measures seven and a-half inches across the mouth and was probably about the same depth.

Mr. Robinson found nearly all the pieces, but some of them have since disappeared.

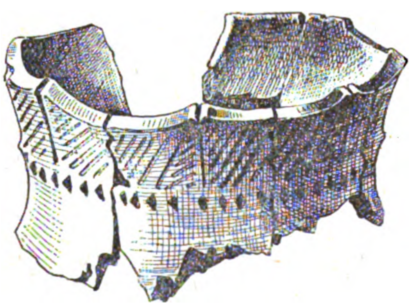

Fig. 26 (21759)—½ dia.

The imperfect pot-rim illustrated by fig. 26 is peculiar in being marked by a series of irregular scallops, very carefully made, and showing considerable taste. The other markings are such as we find on numerous pottery fragments.

For this interesting specimen we are indebted to Mr. Neil Sinclair, who found it on lot 25, concession 2, Fenelon Township.

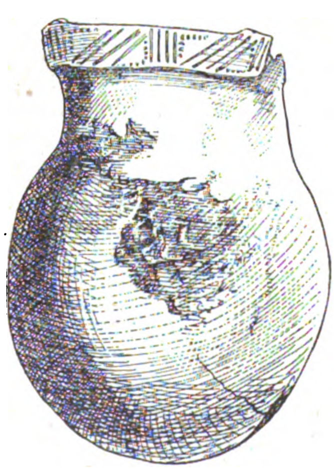

Fig. 27 (21883) ¼ dia.

The pot here figured was found in a "Mountain" face crevice on lot 10, con. 5, Clinton township, Lincoln county, by Mr. Emmerson Grobb, and was presented to the Museum by Mr. T. W. Moyer, of Campden. Although not in perfect condition it is sufficiently so to show its complete form. A portion of the edge on the farther side is broken to a depth of three inches. Long exposure to the weather has rendered it somewhat fragile, and the drip from overhanging rocks has left a slight deposit of lime on portions of the surface both inside and outside. It has ornamental markings round the lip and on the outside only. The situation in which this vessel was found would connect it with the Attiwandarons, or Neutrals, a people but poorly represented in the museum by this class of work.

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An imperfect specimen of very large size is in possession of Mr. D. H. Price, an enthusastic collector; and some years ago, a company of campers found several specimens in a mound on the lake Erie shore, in the township of Wainfleet, but these were retained by the finders who were from the United States. Figure 27 represents our best specimen of Neutral pottery.

BONE.

Fig. 28 (21728) ½ dia.

This very beautifully formed and finished awl or needle was found on lot 44, Eldon township by Mr. Laidlaw.

On the side shown a keel or midrib extends from the end of the handle until it merges into the roundness of the other end within an inch of the point. The oppoiste side is almost flat, there being but a slight elevation along the handle part, on each side of which ridge is a row of markings similar to those seen on the engraving.

The specimen has the worn appearance of long usage, and is as smooth and bright as if it had been in use the day before it was found.

Fig. 29 (21529) ½ dia.

Barbed bone fish-hooks are not at all common, and bone fish-hooks, or any kind of hooks are anything but plentiful in Ontario. Besides the one here figured we have but another, and from the same locality. The hook represented by figure 29 was found by Mr. G. E. Laidlaw, or one of his assistants on a village site in Eldon township, Victoria county. Whether barbed specimens of this kind are indicative of Eskimo influence may be discussed. From the same neighborhood we have a small walrus tusk, and we are warranted therefore in inferring some direct or indirect connection as having existed between the Eskimo and people living as far south as Victoria county.

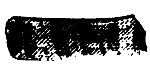

Fig. 30 (21652) ½ dia.

This bone bead supplies us with an interesting suggestion. It was found on lot 22, con. 8, Eldon township, by Mr. G. E. Laidlaw, and is marked by very distinct pink bands the widest of which is about one eighth of an inch across. Those at each end correspond with the form of the bone being nearly at right angles to the axis of the bead, but the others are at an angle, presenting thus the appearance of what would result from the winding of a narrow band round the piece of bone leaving spaces between the coils, and then dipping the object into a dye. Among the large number of such bone beads that have been found in this Province no other that I know of has been met with, so marked, or even affording any hint of coloration, and yet when we remember the native love of color we are at once ready to admit what we might readily have suspected, namely, that all bone beads were probably decorated in some such way. Bone easily takes color, and a necklace stained with rich juices of flowers, berries, barks and roots, in various patterns must have proved much more attractive than one of the unadorned material.

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That this is the only bead to come under our notice showing evidence of such coloring is probably owing to the fact that bone, when buried, parts with markings of this kind by soil-absorption with comparative freedom, or, that at any rate it does so long before the material itself shows any signs of decay. In the present case there must have been something in the nature of the earth that lent itself to the preservation of the color.

The foot-bone, of which two views are here shown, differs from any of the other somewhat numerous specimens of this class in the museum, on account of the holes, eight of which are bored round the edge of the wide end. Through the smaller end an oval hole has been cut, as in the lesser engraving, but this is not unusual in such bones.

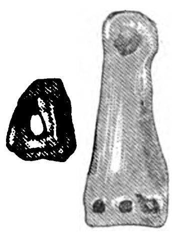

Fig. 31. ½ dia.

Objects made from this kind of bone seem to have had various uses. Some were perhaps used for gambling purposes, like dice, and some for leg or knee bangles, but this one strongly resembles the bones still used in an Ojibwa game, the name of which was given to me, improperly I think, as Pe-kunj-gun-e-gun, or "stabbing at a bone." A complete set of these with string and pointer, was given to us several years ago by Mr. J. E. Wood on the Mississauga Reserve near Hagersville. It is described and figured in a former report.

One of the bones in this set is perforated similarly. The chief difference between figure 31 and it is, that the latter like all the rest of the set (seven) has been formed conically by hand so that when hanging on the string one bone enters the other. Found on lot 18, Gull R. Range, Bexley township. Laidlaw collection.

A curiously carved nut, two and three-fourth inches long, found in the east end of Hamilton, was referred to in last report, p. 29, as the Macassa, for the want of a better name, and because the object was dug up near the shores of Burlington (formerly Macassa) Bay.

Respecting this specimen it was said, "Reference to the find is made here mainly in the hope that some reader may be able to throw light on the subject, through any knowledge he possesses of similar objects in Europe." Somewhat strangely a piece of similar work has lately come into our hands through Mrs. L. De Blaquiere of this city, who states that her specimen came from Malta. The kind of substance used is not yet known, although it is probably a nut.

Correction.

In Mrs. Holden's translation of Mr. Benjamin Sulte's article on the War of the Iroquis in last year's report, page 127, in the sentence, "The Jesuit Relation of 1660, written by Etienne Brulé, furnishes a good account of this anti-fraternal warfare." The words "written by Etienne Brulé" should be omitted.

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THE FLINT WORKERS: A FORGOTTEN PEOPLE.

By the VERY REV. WM. R. HARRIS, Dean of St. Catharines.

On the farm of a man named Chester Henderson, close to what is known as the Talbot road, and about seven miles inland from Port Stanley, on the north shore of Lake Erie, a little over 100 miles west of Toronto, there is a circular rim of earth enclosing about two and a half acres of land. On the 29th of last September, accompanied by Mr. James H. Coyne, who has written a valuable monograph on the early tribes of this section of the country, I visited this historic embankment and secured photographs, which, unfortunately, give but a feeble idea of its height and extent. Within the fort and north of it the trees are still standing, but it is only a few years since the primeval forest shrouded it from profanation. Rooted on the raised earth are venerable chronological witnesses of its great age. On the stump of a maple we counted 240 rings, and on that of an elm, which measured four feet in diameter, were 266. The average height of the bank was three feet, and allowing for the subsidence of the soil, it was probably at one time four feet high. A small stream runs along this elliptical enclosure, which for about half its course has cut for itself before leaving the fort a bed about seven feet below the general level. To the south, where this stream trickles through an opening, there is a rude and desolate gap, and indications of what was once a gateway. The walls terminating at this entrance are squarely shouldered and show a deftness and skill of no mean order on the part of the builders.

These embankments are familiarly known as the "Southwold Earthworks," and are probably the best ruins of an Indian palisaded village to be found in Western Canada. The plan of the fort is purely aboriginal, and the labor involved and patience required in its construction must with their primitive tools have been very great.

A plaster model of the fort is now in the Archæological Museum of Ontario, in Toronto. In the ash-heaps and kitchen-middens in its immediate neighborhood there was not found anything that would give the slighest hint of European presence. Flint spear and arrow heads, stone casse-tetes (or skull crackers), fragments of pottery, clippings of flint, rubbing stones, pipes of steatite, and clay and mealing stones, have from time to time been dug up, but no article bearing a trace of copper or iron was found.

More than 250 years have passed away since the fort was constructed, and the hardy settlers of the region still look with wonder and curiosity upon the relic of a vanished people, whose origin is to them as much a mystery as the law of gravitation. Indeed, the little that the students of ethnology and archæology know of this peninsular tribe is gathered from the writings of the early missionaries, and collected from the embankments, mounds, ossuaries, separate graves and village sites. From the tools and weapons of bone, and instruments of horn and stone, we are left to draw our own conclusions, and reduced to the necessity of surmising and guessing. The prehistoric Neutrals are in the age of the world but of yesterday, yet it is easier to present the lover of technological lore with illustrations of the arts and industries of

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Egypt and Assyria, than to illustrate from actual specimens of household utensils, working tools and ceremonial implements, the social and domestic state of this North-American tribe. If Sanson's map be accurate, within these earthwalls was the neutral village of Alexis, visited by the heroic Brebeuf and the saintly Chaumonot in the winter of 1640-41.

But let us reconstruct the village, and people it as it was when the devoted priests entered the gateway already mentioned. When the chief men of the 80 or 90 families composing a Neutral village selected this site to be their abiding place for 12 or 15 years, they examined with characteristic sagacity its savage surroundings. Its seclusion in the gloomy forests, the fertility of the land, the gurgling brook winding through and around the giant elms; the abundance and variety of berries, and the succulent beech-nuts that fell in showers every autumn, promised them years ot indolent repose. They are satisfied with their selection and begin at once their new village. The ditch around the town is dug with primitive wooden spades, the earth carried or thrown up on the inside, trees are felled by burning and chopping with stone axes, and split in to palisades or pickets. These are now planted on the embankment in triple rows, that are lashed together with pliable twigs and strips of elm bark. Sheets of bark are fastened on the inside to the height of six or seven feet, and a timber gallery or running platform constructed, from which heavy stones may be cast or boiling water poured upon the heads of the attacking Iroquois or formidable Mascoutin. Notwithstanding the enormous labor expended upon its construction, this fortified embankment scarcely deserves the name of a fort, but it is at least as strong and well built as those of the enemy. Within the enclosure cluster the lodges of the tribe, formed of thick sheets of bark fastened to upright poles and cross-beams, covered with bark and skins. Many of the lodges house from eight to ten families. The fires are on the ground on a line drawn through the centre, with openings in the roof, which serve for chimneys and windows. Here grizzly warriors, shriveled squaws, young boys aspiring to become braves, and girls ripening into maturity, noisy children, and dogs that never bark, mingle indiscriminately.

There is no modesty to be shocked, no decency to be insulted, no refinement of feeling to be wounded; for modesty, decency and refinement of feelings were dead ages before the tribe began its western wanderings. In these ancient wilds clearings were made, branches hacked off from the wind-felled trees, piled around the standing timber and set on fire, or the trees girdled, through whose leafless branches the sun ripens the Indian corn, beans, tobacco and sunflowers, planted in the spring by the squaws, and whose seeds were probably obtained in the remote past from Southern tribes. The people who inhabit this village are Attiwandarons, or members of the great Neutral nation, whose tribal grounds stretched from the Genesee River to the Detroit. But before entering upon an epitomized history of this populous and formidable nation, one of whose fortified towns we have just resurrected, it will be expedient rapidly to outline the territorial and tribal divisions east of the Mississippi, when, in 1613, Champlain entered the St.

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Lawrence and began the ascent of the Ottawa. All the nations whose tribal lands drained into the valley of the St. Lawrence River were branches of two great families; the roving Algonkin, the Bedouins of the mighty wilderness, who lived by fishing and hunting; and the Huron-Iroquois, hunters and tillers of the soil, whose warriors were the boldest and fiercest of North America. The Algonkins were divided and sub-divided into families and tribes. The Gaspians, Micmacs and the Papinachois or Laughers roamed the forest on both sides of the Great River, as far as Tadousac and Cacouna. Along the banks of the gloomy Saguenay, and into the height of land forming the watershed towards Lake Nimiska, the Mistassini, the Montagnais, the Tarcapines and Whitefish hunted in that desolation of wilderness and fished in its solitary lakes and streams. Ascending the Ottawa River to the Allumette Islands, tribes of lesser note paid tribute to the One Eyed nation, called by the French, "Du Borgne," from the fact that for three generations their war chiefs had but one eye. They held the Ottawa and exacted tribute from other tribes passing up or down the river. On the borders of Lake Nipissing dwelt the Nipissings or Sorcerers, while to the north and northwest were the hunting grounds of the Abittibis and Temiscamingues, after whom Lake Temiscamingue is named.

North of Lake Huron, running from the mouth of the French River and circling round the coast to Sault Ste. Marie, roved five or six hordes of Algonkins. The writings of Brother Gabriel Sagard, the map of Champlain, 1632, that of Ducreux, 1660, the Jesuit Relations, and the memoirs of Nicholas Perrot certify to the hunting and fishing grounds of these Algonkin Bedouins. The Bruce peninsula and the great Manitoulin, "The Island of Ghosts" were the home of the Ottawas, or Large Ears, called by the French, Cheveux-Relévés (Raised Hair) from the peculiar manner in which they wore their hair. Farther west were the Amicoues or Beavers, the Santeurs or Ojibwas, including the Mississaugas and Saugeens. The roving hordes that stretched from the head waters of Lake Superior to the Hudson Bay, the Wild Oats, Puants and Pottawatomies, the Mascoutin, or Nation of Fire, the Miamis, the Illinois, were all branches of one Algonkin tree. The great Huron-Iroquois family included the Tionnontates or Petuns, the Hurons or the Wyandots, Andastes of the Susquehanna, the Tuscaroras of North Carolina, the Five Iroquois nations, the Eries, and the Attwiandarons or Neutrals. The tribes of this family were scattered over an irregular area of inland territory, stretching from Western Canada to North Carolina. The northern members roved the forests about the Great Lakes, while the southern tribes lived in the fertile valleys watered by the rivers flowing from the Alleghany Mountains.

A problem of ethnology, which will perhaps never be solved, confronts us in the study of the aboriginal people of this section of our country. What were the causes that led to the migration and settlement of the tribes in Western New York and Southwestern Ontario? At what time did the Iroquois separate from the Hurons, and the Attiwandaron or Neutrals claim independent sovereignity? When did the exodus of the Neutrals occur, and what was the route followed by this adventurous clan?

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Mr. David Boyle, the Canadian archaeologist, in his "Notes on Primitive Man," suggests that the Neutrals were among the first to leave the main body. "Regarding their movement," he continues, "there is not even a tradition, but their situation beyond the most westerly of the Iroquois, and the fact that they had no share in the Huron-Iroquois feuds, point to an earlier and wholly independent migration. It is known also that their language varied but slightly from that of the Hurons, which there is reason to regard as the parent tongue, and the inference is that their separation must have taken place from the Wyandot side of the mountain down by the sea long before the great disruption compelled the older clans to seek a refuge on the Georgian Bay."

Dr. Hale, in his "Book of Iroquois Rites," expresses the opinion that, centuries before the discovery of Canada, the ancestors of the Huron-Iroquois family dwelt near the mouth of the St. Lawrence. As their numbers increased dissensions arose. The hive swarmed and band after band moved off to the west and south. Following the south shore of Lake Ontario, after ascending the St. Lawrence, the main bodies of the migrants afterwards known as the Hurons or Wyandots, reached the Niagara peninsula. Remaining here for a period, they eventually rounded the western end of the lake and in the course of time took permanent possession of the country lying to the south of the Georgian Bay. After a while they were joined by the Tionnontates, who followed the Ottawa route. This, however, is but tradition, and in it there is nothing to account for the migration and settlement of the Neutrals along the north shore of Lake Erie, and eastward till they reached the country of the Iroquois. The first authentic mention of this powerful nation, we find in Champlain's writings, where he tells us that in 1616, when he visited the Georgian Bay region, they were then in friendly alliance with the Ottawas and Andastes, and were waging war on the Nation of Fire, whose tribal lands extended through Michigan, as far east as Detroit. When Champlain was on a visit to the Ottawas, he expressed a wish to see the Neutrals, but it was intimated to him that his life would be in danger, and he had better not undertake the journey. In 1626, Father Daillon, a member of the Franciscan Order, was evangelizing the tribes of the Huron Peninsula, when he received a letter from Father LeCaron, the Superior, instructing him to visit the great Neutral tribe or Attiwandarons, and to preach to them the saving truths of Christianity. Joseph de la Roche Daillon was a man of extraordinary force of character, "as distinguished," wrote Champlain, "for his noble birth and talents, as he was remarkable for his humility and piety, who abandoned the honor and glory of the world for the humiliation and poverty of a religious life."

Of the aristocratic house of the Du Ludes, society tendered him a courteous welcome, the army and the professions were opened to him, wealth, with its corresponding advantages, too, were his, when he startled his friends, shocked society and grieved his family by declaring his intention of becoming a member of the Order of St. Francis, a religious association of barefooted beggars. The ranks of the secular clergy offered him the probabilities of a

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mitre, and the hope of a Cardinal's hat. His family's wealth and position in the State, his father's influence at court, his own talents and the prestige of of an aristocratic name, all bespoke for him promotion in the Church.

His friends in vain pleaded with him to associate himself with the secular priesthood, and when they learned that he was not only inflexible in his resolution to join the Franciscans, but had asked to be sent into the wilderness of Canada, they thought him beside himself. He left France in the full flush of his ripening manhood, and for the love of perishing souls, entered upon the thorny path that in all probability would lead to a martyr's grave.

On the 19th June, 1625, he reached Quebec, and in the following spring accompanied by Fathers Brebeuf and De la Noue, he left Quebec with the flotilla, whose canoes were headed for the Huron hunting grounds in northern forests. When he received LeCaron's letter, he was at Carragouha, on the western coast of the Huron peninsula, where he opened the mission of St. Gabriel. In obedience to the request of his superior, accompanied by two French traders, Grenalle and LeVallee, he left Huronia, October 18, 1626, and on the noon of the sixth day entered a village of the Neutrals. "All were astonished," he writes, "to see me dressed as I was and to learn that I desired nothing of theirs, but only invited them by signs to lift their eyes to Heaven, make the sign of the cross and receive the faith of Jesus Christ." Meeting with a hospitable welcome he advised Grenalle and LeVallee to return to Huronia, and after escorting them some distance on their way, he retraced his steps to the Indian town.

Gilmary Shea, in an article which he wrote for the "Narrative and Critical History of America," is of the opinion that he crossed the Niagara River, and visited the villages on its eastern side. Daillon states in his valuable letter that a deputation of ten men of the eastern branch of the Neutrals, known as Ongiaharas, or Kaw-Khas, waited upon him bearing a request to visit their village, Onaroronon, a day's march or about thirty miles from the land of the Iroquois, and that he promised to do so when spring opened. Notwithstanding the deservedly great authority of Gilmary Shea, I am of the opinion that Daillon never crossed the Niagara River. Aside from this promise, which he was not in a position to fulfil, there is no hint in his letter to lead us to believe that he visited the eastern villages. The priest spoke to the Neutrals of the advantages of trading with the French, and suggested that he himself would accompany them if a guide could be furnished to the trading-post on the river of the Iroquois. Differing from the majority who have touched on this subject I am satisfied that the place of trade was on Lake St. Peter, fifty miles below Montreal. It was called Cape Victory or Cape Massacre, in memory of the hundred Iroquois, who in 1610 were killed by Champlain and his Algonkin allies. On the Island of St. Ignace, directly opposite the mouth of the Richelieu, was the "Place of Trade," referred to by Sagard in 1636. Champlain says that the Iroquois held possession of the St. Lawrence and closed it against other tribes, and it was for this reason that the Hurons always went by the Ottawa, when leaving on their trading excursions with the French. The Hurons hearing that Daillon was

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likely to prevail upon the Neutrals to deal directly with the French, and fearing they would lose the profits that accrued to them, by exchanging French goods at high rates for the valuable furs of the Neutrals, became seriously alarmed. They hastily despatched runners into the Neutral country, whose extraordinary reports almost paralyzed the people with fear. The Neutrals with horror learned that the priest was a great sorcerer, that by his incantation the very air in Huronia was poisoned; and that the people withered away and rotted into their graves; and that if they allowed him to remain among them, their villages would fall to ruin and their children sicken and die.

The Neutrals took alarm, treated the priest with withering contempt refused to listen to him, and intimated that unless he left the country, they would be compelled for their own safety to kill him. The priest deemed it prudent to return to Tonchain, in Huronia, from which place on the 18th of July, 1627, he dates his most interesting letter. In his report of the mission, he speaks of the climate with appreciation, notes the incredible number of deer, moose,? beaver, wild cats and squirrels that filled the forest; "the rivers," he adds, "furnish excellent fish and the earth gives more grain than is needed. They have squashes, beans and other vegetables in abundance and very good oil. Their real business is hunting and war. Their life, like that of the Hurons, is very impure, and their manners and customs quite the same."

The priest was probably the first white man who ever entered the Niagara Peninsula, for the traders and couriers-de-bois had not yet ascended the Ottawa River. Etienne Brulé, the dauntless woodsman and interpreter to Champlain, when he left Huronia with twelve Wyandots on an embassy to the allied Eries crossed Lake Ontario to the east of the Senecas, but there is no record to show that he ever entered the Neutral country. Fourteen years after Daillon's return, the Jesuit Fathers of the Georgian Bay region, who had established permanent missions among the Hurons, began to cast wistful glances on the neighboring nations, and to open missions among the Petuns or Tobacco Indians, the Ottawas and the Nipissings. Fathers Brebeuf and Chaumonot were selected for the mission to the Neutrals.

Jean de Brebeuf was the descendant of a noble French family, who abandoned the honors and pleasures of the world for the hardships and perils of missionary life. He arrived at Quebec in 1625, passed the autumn and winter with a roving band of Montagnais Indians, enduring for five months the hardships of their wandering life, and all the penalties of filth, vermin and smoke, abominations inseparable from a savage camp.

In July, 1626, he embarked with a band of swarthy companions, who were returning from Quebec to Georgian Bay, after bartering to advantage canoe loads of furs and peltries. Brebeuf was a man of splendid physique, of broad frame and commanding mien, and endowed with a giant's strength and a tireless endurance. Bravery was hereditary in his family, and it is said that he never knew what the sensation of fear was. He was a man of extraordinary piety, kindly sympathies and an asceticism of character that to the "natural man," mentioned by St. Paul, is a foolishness beyond his understanding. He wrote a treatise on the Huron language, which was published

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in Champlain's edition of 1632, and republished in the "Transactions of the American Antiquarian Society," as a most precious contribution to learning.

His companion, Joseph Marie Chaumonot, or as he is styled in the archives of his order, Josephus Maria Calmonotius, was his very antithesis. He was born on March 9, 1611, and in the fall of 1639 reached the Huron country. He was timid even to fear, his nature was impressionable, and while in his studies he scored one success in literature, he failed as a theologian. "Profectus in litteris et theol. parvus" is written after his name in the archives of his order. He was credulous almost to superstition, shrank from his surroundings, as from the approach of a dangerous reptile; yet under the mysterious influence of Divine Grace, and by an indomitable and unsuspected force of will he conquered human infirmity, and became one of the most conspicuous figures and admirable characters of the early church in Canada. He had a prodigious memory and thoroughly mastered every dialectical and idiomatic alternation of the Huron language and its linguistic affinities. He drew up a grammar and dictionary which continued for years to be an authority, not only for the Huron language, but for all the kindred Iroquois tongues.

His grammar was published twenty five years ago in the "Collections of the Quebec Literary and Historical Society," and is one of the most important of the linguistic treasures which American ethnology owes to the early missionaries. On November 2, 1640, the two priests left the Huron village of St. Joseph to bear the message of the gospel anew to the great nation of the Attiwandaron. The task they had set themselves was one fraught with serious difficulties, for the path lay through a country reposing in the desolation of solitude, and its end might be a grave. Winding through the primeval forest, the trail crossed streams, through which they waded kneedeep. Windswept and uprooted trees lay everywhere around them, and when night with its eternal silence shrouded the forest they sought a few hours of rest under the shadow of some friendly pine.

After a journey of five days the travellers on the 7th of November entered the Neutral village Kandoucho. To this bourg they gave the name of All Saints, placed the whole country under the protection of the angels, and referred to it afterwards as the Mission of the Holy Angels. To their surprise they learned that an evil reputation had already preceded them, and no hospitable welcome awaited them. The Hurons, fearing their influence would divert the trade and custom of the Neutrals from themselves to the French, resolved that at all hazards this great misfortune must be averted.

Messengers bearing gifts of hatchets and wampum belts went from village to village proclaiming that they were commissioned by their cousins and kinsmen of Huronia to inform the Neutrals that if they allowed the pale-faced sorcerers to dwell among them famine and plague would desolate their villages, their women would be struck with sterility, and the nation itself fade from off the face of the earth.

Brebeuf, who was known by his Indian name of "Echon," was looked upon with horror, as a dangerous sorcerer, whose incantations were dreadful in their effects. A thousand nameless fears took possession of them, they

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avoided the men of God as they would poisonous reptiles, and retired from their approach as from that of a ravenous beast. Their very footsteps were shunned, the paths upon which they walked were infected, and streams from which they drank were poisoned. No one dared to touch a single object belonging to them, and the gifts which they offered were rejected with horror. In fact the spectres of fear and consternation were everywhere, and in the presence of this universal terror, the chiefs summoned a council to determine the fate of the priests. Three times the fathers were doomed to death, and three times the uplifted tomahawk was lowered by the force of arguments advanced by some of the elders. The missionaries visited 18 towns, crossed the Niagara River near Black Rock Ferry, and went as far as Onguiara, a village on the eastern limits of the Neutral possessions. In the 40 towns of the nation, they estimated a population of 12,000, but claimed that three years before their visit, there were 25,000 souls in the country. This extraordinary reduction in their numbers was occasioned by repeated wars, but principally by a pestilence which had ravaged the country. Along the winding paths through the forest, that interlaced and crossed and crossed again, the Fathers went from town to town, suffering from cold and hunger, and bearing a charmed life. But the black-robed sorcerers with their instruments of necromancy, their crucifixes, crosses and rosary; their ink horns and strange hieroglyphics, the complete outfit of the black art, were held in horror and detestation.

Despairing of accomplishing any good for the tribe, or of overcoming their inveterate prejudices, the Fathers resolved to bid them goodbye, and retrace the path to the Huron villages. In the second week of February, 1641, they began their homeward journey. They crossed the Niagara River at Lewiston, and reaching its western banks, disappeared in the shrouding forest. On their return journey they were snowbound at a town which they christened St. William, when outward bound. Here Chaumonot traced his rough map of the Neutral country, and Brebeuf added to the Huron dictionary, many idiomatic words of the Neutral language.

On the 19th of March, 1641, the feast of St. Joseph, patron of the Huron missions, Brebeuf and Chaumonot, after an absence of almost five months, reached the village of St. Mary on the Wye. Among the 18 villages visited only one, that of Khioetoa, called by the Fathers St. Michael, extended to them a partially friendly greeting. Chaumonot, at the request of Father Lalemant, now wrote his report of their visit to the Neutrals, which is to be found in the Relations of the Jesuits, 1641. This remarkable and interesting letter practically furnishes all the information bearing on this mysterious tribe.

As the Neutrals were of the parent stock of the Huron-Iroquois, their government, criminal code, marriages and religious conceptions were alike. Their dances and feasts, methods of carrying on war, their treatment of prisoners, cultivation of the soil, the division of labor between men and women, their love for gambling and manner of trapping and hunting, were also similar to those of the Iroquois and Hurons, with which we are all so

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familiar. The missionaries draw particular attention to their treatment of the dead which they kept in their lodges, till the odor of decaying flesh became insupportable.

They then removed them to elevated scaffolds, and after the flesh had been devoured by carrion birds or rotted away, they piously collected the bones and retained them in their houses, till the great communal feast of the dead, or tribal burial.

"Their reason," writes Father Chaumonot, "for preserving the bones in cabins, is to continually remind them of the dead, at least they so state." This tribe carried to an insane excess, the Indian idea, that madness was the result of some superhuman or mysterious power, acting on the individual, and that any interference with the freedom or license of a fool would be visited with the wrath of his guardian spirit or oki. Pretended maniacs were found in every village, who, anxious to acquire the mystic virtue attributed to madness, abandoned themselves to idiotic folly. "On one occasion," writes the Father, "three pretended maniacs, as naked as one's hand, entered the lodge where we were, and after performing a series of foolish antics, disappeared. On another occasion some of them rushed in, and seating themselves beside us, began to examine our bags, and after having taken away some of our property they retired, still conducting themselves as fools." In summer the men went stark naked, figures tatooed with burnt charcoal on their bodies from head to foot, serving for the conventional civilized garments. The genealogy of the British nobleman is shown in "Burke's Peerage," but the Neutral warrior improved on this, by tracing his descent in fixed pigments on his naked body.

It is hardly necessary in this paper to state why the Neutrals were so called by the French, but it will be interesting to inquire, how for ages they were able to hold aloof from the interminable wars that from remote times were waged between the Hurons and Iroquois? There is no other instance in aboriginal history where a tribe occupying middle or neutral lands was not sooner or later compelled to take sides with one or the other of the nations lying on its opposite frontiers, if these nations were engaged in never-ending strife. There is but one solution of this problem, and that is to be found in the immense quantities of flint along the east end of Lake Erie. Without flint arrow and spear heads the Iroquois could not cope with the Hurons, nor the Hurons with the Iroquois; and as the Neutrals controlled the chert beds, neither nation could afford to make the Neutrals its enemy. The Neutral tribe had easy access to an unlimited supply of material for spear arrow heads and scalping knives. Extensive beds of flakings and immense quantities of flint were found along the Erie shore, near Point Abino, where the chert-bearing rock is almost abundant. Even to-day, after the beds have been worked for centuries, many of the nodules picked up are large enough to furnish material for 20 or 30 spear heads or arrow tips. For miles along the beach heaps of flakes may be seen, and flint relics are found in all parts of Ontario and Central and Western New York, corresponding in appearance with the Lake Erie material.

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The Iroquois were too shrewd and the Hurons too far seeing to make an enemy of a people who manufactured the material of war, and controlled the source of supply. To those who take a deep interest in all that concerns primitive life in America, the excellence of the workmanship manifested in the flint instruments found on the Niagara Peninsula and in the neighborhood of Chatham and Amherstburg, must convince them that the Neutral excelled all other tribes in splitting, polishing and fitting flakes of chert-bearing rock.

Independent of its general value as an ethnological factor on the study of the Indian progress to civilization, it is also a conclusive proof that among savage peoples, that which they possess, and is eagerly sought after by others, is cultivated or manufactured with considerable skill. Primitive methods of manipulating raw material, and of handling tools, must ever prove attractive to the student of ethnology, for in these methods we observe the dawn of ideas, which are actualized in their daily lives. The Neutrals when discovered by Father Daillon, in 1626, were like the Britons when conquered by Cæsar, many degrees advanced beyond a low degree of savagery. Chaumonot states, that the Neutrals were physically the finest body of men that he had anywhere seen, but that in cruelty to their prisoners, and in licentiousness, they surpassed any tribe known to the Jesuits. It would appear that as a rule there was a communal understanding among the Indians of North America, that among the prisoners who were taken and tortured to death, women were not to be subjected to the agony of fire. At times this compact was broken by the Iroquois and the Illinois, but the Neutrals were, it would seem the only tribe that habitually violated this understanding, for they subjected their female prisoners to the atrocious torture of fire and with a fiendish delight revelled in their cries of agony. I have already stated on the authority of Chaumonot, that the tribe was given over to licentiousness, and I may add that in point of cruelty and superstition, it was not surpassed by any native American people, of whom we have any record.

Had it been the nature of the Attiwandarons to live a reasonably clean life they might have become the most powerful branch of the great Huron-Iroquois family. Long immunity from attacks from without, the richness and fertility of their soil, and the abundance of vegetable and animal food, permitted them to devote their leisure to the enjoyment of every animal luxury their savage nature could indulge in; and they suffered the consequences that follow from riotious living the world over. Gibbon, in his "Decline and Fall of the Roman Empire," states that the descendents of the all-conquering Romans became wasted by dissipation, and that when the Scandinavian hordes poured from their northern forests into the plains of Italy the effeminate Romans had not the strength to oppose them.

The licentiousness of the Neutrals, their freedom from national and domestic cares destroyed their warlike courage, and to all but their inferiors in number they were regarded as women. They quailed before the face of the Five Nations, and stood in awe of the Hurons, who refused them the right of way to the Ottawa, but as a bloody pastime they carried on cowardly and ferocious wars against the weak western Algonkin tribes. Father Rag-

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ueneau relates that in the summer of 1643 they threw 2,000 of their warriors into the prairie of the Nation of Fire, and invested one of their fortified towns, which they stormed after a 10 days' seige. The slaughter that followed was appalling. They burned 70 of the enemy at the stake, torturing them the meanwhile with a ferociousness satanic in its prolongation and ingenuity. They tore out the eyes and girdled the mouths of the old men and women over 60 years of age, and scorning their appeal for death, left them to drag out a woeful and pitiable existence They carried off 800 captives, men, women and children, many of whom were distributed among the Neutral villages, and by a refinement of cruelty surpassing belief, were subjected to atrocious mutilations and frightful burnings, prolonged from sunset to sunrise.

There is a mysterious law of retribution, that in the accuracy of its application, is reduced to a mathematical certainty. The Neutrals, who had filled up the measure of their iniquity, had by their ruthless cruelty and unbridled licentiousness, invoked their doom. From the distant forests of the Senecas, there came a prophetic warning, and its message was, The Iroquois are beginning to open a grave for the great Neutral nation, and the war cry of the Senecas will be the requiem for their dead. After the Mohawks and Senecas, the war-eagles of the wilderness, had scattered and destroyed their enemies, the Hurons, they sought excuses to issue a declaration of war against the Attiwandarons. Father Lafiteau states on the authority of the Jesuit Garnier, that when the Iroquois had destroyed their enemies, and were in danger of losing, from want of practice, their warlike dexterity and skill, Shonnonkeritoin, an Onondaga, proposed to the war chief of the Neutrals, that their young men should meet in occasional combats in order to keep alive among them a warlike spirit. The Neutrals, after repeated refusals, at last with much hesitation reluctantly consented. In a skirmish that took place soon after the agreement, a nephew of the Iroquois chief was captured and burned at the stake. The Onondagas, to avenge his death, attacked the Neutrals, and the Mohawks and Senecas marched to the assistance of their countrymen. Father Bressani says that the friendly reception and hospitality extended to a fugitive band of Hurons, after the ruin and dispersion of that unhappy people, excited the wrath of the Iroquois, who for some time were patiently awaiting a pretext to declare war.

I have somewhere seen it stated that the emphatic refusal of the Neutrals to surrender a Huron girl, who escaped from the Senecas, was the cause of the war; but whatever may have been the reason, it is certain from the Relations of the Jesuits, that in 1650, the war between the Iroquois and the Neutrals began, and was carried on with a ruthlessness and savagery, from the very perusal of which we recoil with horror. In this year the Iroquois attacked a frontier village of the enemy within whose palisaded wall were 1,600 warriors. After a short siege, the attacking party carried the fortified town, and made it a slaughter-house. The ensuing spring they followed up their victory, stormed another town, and after butchering the old men and children, carried off a number of prisoners, among them all the young women, who were portioned out as wives among the Iroquois towns. The Neutral

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warriors, in retaliation, captured a frontier village of the enemy, killed and scalped 200, and wreaked their vengeance on 50 captives, whom they burned at the stake.

When the Iroquois heard of the death of their braves, they met to the number of 1,500, crossed the Niagara River, and in rapid succession, entered village after village, tomahawked large numbers of the inhabitants, and returned to their own country, dragging with them troops of prisoners, reserved for adoption or for fire.

This campaign lead to the ruin of the Neutral nation. The inland and remote towns were struck with panic, people mad with the instinct of self-preservation fled from their forests and hunting grounds, preferring the horrors of retreat and exile to the rage and cruelty of their ruthless conquerors. The unfortunate fugitives were devoured with famine, and in scattered bands wandered through the forests, through marshes and along banks of distant streams, in search of anything that would stay the devouring pangs of hunger.

From the mouth of the French River to the junction of the Ottawa, and from the fringe of the Georgian Bay to the Genesee, the land was a vast graveyard, a forest of horror and desolation, over which there hovered the sceptre of death, and on which there brooded the silence of a starless night. In April, 1652, it was reported at Quebec that a remnant of this tribe had joined forces with the Andastes and made an attack upon the Senecas. The Mohawks had rushed to the help of their countrymen, but the issue of the war was unknown. In July, 1653, word was brought to the same city that several Algonkin tribes, with 800 Neutrals and the remnant of the Tobacco Nation, were assembled in council near Mackinac. They are mentioned for the last time as a separate people in the "Journal of the Jesuits," July, 1653. Henceforth the nation loses it tribal identity, and merging into the Hurons is known on the pages of history as the Wyandots. Father Fremin, in a letter embodied in the Jesuit Relations of 1670, states that on the 27th of September, 1669, he visited the village of Gandougarae,* peopled with the fragments of three nations conquered by the Iroquois. These were members of the Onnontiogas, Neutral and Huron nations. The first two, he adds, scarcely ever saw a white man, and never had the gospel preached to them.

These were the sons of the slaughtered Neutrals, who were adopted by Senecas and incorporated into the tribe to fill the places of those they lost in their ruthless forays. This is the last time that the Neutrals are ever mentioned in the annals of New France.

*Gandougarae was four miles southeast of Victor Station, in Ontario County, N. Y.

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INDIAN VILLAGE SITES IN THE COUNTIES OF OXFORD AND WATERLOO.

By W. J. Wintemberg.

During the season just ended I visited some of the village sites mentioned in last year's report, but found nothing worthy of note. Last summer my attention was directed to three other sites, but being otherwise occupied then and winter setting in earlier than I anticipated, I had to forego the pleasure of visiting these places this year, but intend doing so next spring.*

The visits to the old sites, besides being made for the purpose of procuring specimens, were made to verify a theory which I have regarding the comparative ages of some of the villages.

That the Neutrals or Attiwandarons were not the true autochthones of this part of Ontario is evident. Belonging, as they did, to the Huron-Iroquois family of Indians, they must have at some time, perhaps not very long before the advent of the Europeans, left the main body and settled where they were subsequently found by the Jesuit missionaries. Whether their predecessors were an Algonkin people or were related to the builders of the mounds we will never know, but whatever they were, they certainly left behind them many palpable evidences of their existence.

It is my purpose in this paper to show that some of the Oxford village sites were occupied by these pre-Neutral people.

The Neutral villages, Nos. 1, 2, 3, 4 and 8, in Blenheim township, and those in Wilmot (with the exception of the two small isolated camps at Baden lake and on the river bank near New Hamburg), Waterloo and North Dumfries, are invariably located near some spring or small rivulet. The pre-Neutral villages, on the contrary, are without exception found near large streams or small lakes. No. 2 is on the shore of Burgess lake ; while the others, Nos. 5 and 6 and those at Baxter's (lot 10, con. 10) and H. Davison's (lot 9, con. 11) are on the banks of, or near the River Nith. Hart's in East Oxford is near what was formerly a small lake.

In making this assertion I mean that the morass near Mr. Hart's place, which still shakes when you walk across it (owing to the water beneath), was at some remote period an open lake. Successive growths of sphagnum in course of time covered the face of the lake with a thick sheet of vegetable matter which became thicker and sank lower and lower beneath the weight of the accumulated mould of generations upon generations of dead plants until it was metamorphosed into the quaking bog or morass. This would have been the inevitable fate of Burgess lake and of many other small lakes that dot the country if the process of occlusion, or the invasion of vegetable

* Since this was written I received a letter from Mr. Rathbun stating that one of these sites, which is near the River Nith and not far from his place, yielded "Indian skeletons, animal bones, bone awls, pottery, chisels, arrow points, clam shells, pipes, etc." showing that this is a recent or Neutral site. A gouge was also found here a few years ago.

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matter had not been arrested by draining; but in many of them the encroachment of the sphagnous growth may still be observed. For further information consult Prof. N. S. Shaler's paper on the fresh water morasses of the United States, in the 10th annual report of the U. S. Geological Survey, pp. 285-287.

In the fire-places of the Neutral sites large quantities of ashes are found, while in those of the pre-Neutral class there is not the slightest trace of ashes: the spots, however, owe their dark color to igneous action. Another peculiarity in connection with the pre-Neutral sites is the entire absence of relics from the fire-places, but which are invariably found in the unblackened soil surrounding them.

The difference between the pottery found on these Neutral and pre-Neutral sites is also marked. In the last report I noted some of the differences existing between pottery fragments found on two Blenheim sites, namely, Nos. 1 and 2, and it will be unnecessary for me to say anything further regarding the ceramic productions of these two villages. The pottery sherds found on the other recent or Neutral sites bear the same patterns as those found at No. 1. Village site No. 5, which I believe is of the same or, perhaps, even of an earlier age than No. 2, yields pottery fragments which show that the vessels were formed in some coarsely-woven textile mould. Some fragments show the impression of cords, which in one specimen I found are quite plain, even the imprint made by the thin fibres of the twisted cord being visible, but most of the impressions are effaced. Fragments of clay vessels apparently made in this manner were found by Messrs. George and Everett Brown on the bank of the River Nith (lot 20, con. 3, block A, Wilmot tp.). Village site No. 6 produced sherds of very coarse material, with exterior decorations resembling that on specimens from Burgess lake. A combination of circular indentures and incised lines is the characteristic pattern on the fragments from East Oxford. Now, if the character of the pottery found on these sites be taken as a criterion of age, it proves that all the villages were not occupied contemporaneously; those which I believe to be pre-Neutral being inhabited, and possibly even deserted, centuries before the others.

None of the pre-Neutral sites have produced bone relics and clay or stone pipes. The conditions were not favorable for the preservation of the former, which accounts for their absence; but how shall we account for the absence of the pipes? I have always believed that the use of tobacco was universal in this part of North America, but this fact seems to prove the contrary. They could not have disappeared or disintegrated, for the pipes were usually better burnt and tempered than were the larger vessels of clay; therefore we must come to the conclusion that these people did not have pipes and, consequently did not use tobacco; which, however, cannot be said of the Neutrals or the other Iroquois tribes.

It has often been remarked that in the Jesuit relations there is no description or even mention made of those artifacts in stone which we vaguely

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call bird amulets or ceremonial objects. Does not this silence on the part of the Jesuits prove conclusively that such objects were not in use among the Neutrals? And why is it that most of these amulets are found on land far removed from the village sites, or on villages which, judged by the character of the pottery found, shows them to have been more ancient than those which produce fragments of ceramic ware of better material and finish? Mr. Rathbun found quite a number of slate gorgets and other amulets on village site No. 2, and on the site in East Oxford Mr. Hart also found some fine specimens. Village site No. 1 and the other Neutral sites produced very few of these objects, and even these may have been found by their inhabitants on ground formerly occupied by the earlier and non-Attiwandaron race.

The ground axe is another implement which has never, so far as I am aware, been found on a Neutral site. Mr. Rathbun found four on the ancient village site on his farm.

The stone perforators from these ancient and recent sites also differ greatly. For instance, those from village site No. 1 are very small and rude, while those from Burgess lake and the camp at Baxter's are very nicely finished specimens indeed. The largest in my collection was found with seven or eight others on the latter place and is a very fine drill of the T-shaped type. Perhaps among the Neutrals, the bone awls, so numerous in their village sites, supplied their place.

Shells Found on Indian Village Sites.

For the purpose of having the shells mentioned in last year's report correctly named I sent a representative collection of local land and fresh-water species to Dr. J. F. Whiteaves, of the Geological Survey of Canada, who very courteously undertook to determine them for me, and to whom I am indebted for most of the specific names given below.

Only three species of the Unionidæ family are found in the village sites in Oxford and Waterloo. The *unio gibbosus*, Barnes, of which two varieties are found—one with the purple and the other with the white nacre—is the most abundant. These, as stated in the report, were no doubt used as pottery slicks, and the flesh may have been used for food. I found valves on village sites Nos. 1 and 3, with the sides ground level. What the ultimate purpose of these shells was we can only surmise. We might assume that this was done to obtain flat disks for wampum, were it not known that no wampum of this kind was ever found in this part of the country. I found a pottery slick on village site No. 1, which seems to be a fragment of the shell of *Margaritana costata*, Rafinesque. On the site near Baden, in Wilmot Township, was found a decorticated valve of *unio ventricosus* Barnes, with two holes, about three-sixteenths of an inch in diameter, drilled through its side.

It is surprising that the aborigines, having any quantity of shells near at hand, should not have used them more extensively. The *unio luteolus*, Lamarck, of which none have yet been found in the ash-beds, would have been more serviceable than the smaller and more fragile *u. gibbosus*, but the Neutrals for some inexplicable reason seem to have preferred the latter.

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The Helicidæ family is represented by only one species, *patula alternata*, Say. Its mottled shell is often met with in ash-beds. I found several that were pierced through the umbilicus. This appears to have been accomplished by breaking a hole through the shell at the apex, but it might also have been done recently, for the shells are very fragile.

Some small fresh-water univalves, *goniobasis livescens*, Menke, are also found, but none are pierced for stringing.

The marine shell, which I called "a species of olivella" in the report, is of the genus marginella, and the species conoidalis. The other shell, referred to as a marine species, is a fresh-water shell belonging to the genus melania and the family melaniadæ. Dawson, in his book entitled Fossil Men and Their Modern Representatives, says: "The wampum of the Iroquois was made of fresh-water univalves, probably the melania."

ROUGH NOTES ON NATIVE TRIBES OF SOUTH AFRICA.

By Frederick Hamilton, M.A.,

Correspondent of the Globe.

In offering these notes upon certain aspects of native life which came under my notice during my stay in South Africa, I must request my readers to bear in mind their entirely accidental and casual character. Mr. Boyle wrote to me after I had landed in South Africa suggesting that I get for him any information, or any objects of interest (not mere curiosities) from an ethnological point of view, and it fell out that very soon after receiving his letter my travels brought me near numerous native kraals. His remarks had quickened my interest in a people whom I found amiable, amusing and interesting, and I purchased from them what household objects I could carry, and from time to time noted down such details as I observed of their domestic habits. The entirely fragmentary nature of my observations are apparent. Inclination must incessantly yield to necessity when travelling under circumstances such as those under which I laboured, and my only claim is that it requires some courage to place before readers notes so random and so trivial as are those which follow.

I may add a word about a very doubtful authority whom I quote frequently. A paragon of servants, Moses Africa was of dubious value as a source of information upon ethnological subjects. He was a Cape boy, one of that mixed race which I believe has now no aboriginal tongue and speaks the languages of the white man, English and Dutch. Moses knew how to get on with the natives and regarded my interest in their domestic arrangements with a bland toleration, which his zeal in my service caused occasionally to deepen into positive interest. But I do not believe that he had any real or accurate knowledge of tribal customs or peculiarities. He made certain assertions which I am disposed to doubt; for instance, he never would admit that any article was a charm, and alwa"s assured me that all articles worn

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were ornaments and nothing more. I had few or no opportunities of checking his assertions, and so have mentioned him when he is the source of my information.

18th February, 1900.—Near the outbuildings of the farmhouse by Paardeberg Drift I noticed a native tanning apparatus. It consists of three sticks lashed together in a triangle, with the skin of an ox attached in such a way as to form a deep pouch, with the triangular opening for mouth. This is erected on sticks, the oxhide bag is filled with a decoction of certain herbs, and in it the skins are steeped. The Boers appear to have adopted this native method, for I repeatedly noticed these tanning appliances near farmhouses. I have appended an odd extract suggested by these cortides.

3rd May, 1900.—Visited a moderate sized kraal near Thaba Mountain, the scene of one part of the battle of Hout Nek. The natives are Barolongs, of the old Moroka Kingdom, which was absorbed by the late Orange Free State about 15 years ago. There we saw mealies (i.e maize) pounded by two women with sticks about two feet six inches long and with rounded ends. For a mortar they were using the hub of an old wheel from a Cape cart. The women sat facing each other, the mortar between them, and wielded the pestles with one hand. Occasionally one would push the mealies back as they rose above the edge in response to the beating of the pestles in the centre. The operation reminded me strikingly of the method of pounding maize in vogue among our North American Indians, as described and illustrated by means of a photograph by Mr. David Boyle in the Archæological Report for 1899. The degree of skill needed to keep up the time so as to avoid blows upon the knuckles particularly struck me.

At this kraal I observed a diminutive seat of much the same design as a steamer chair. Thongs of leather supplied the body of the chair. These tiny stools were quite common.

The hens' nests in the kraal attracted my notice. These were tiny structures about a foot high, made of flat stones set on edge for the walls and also used for the roofs, mud being used to cement them together. Each compartment was large enough to shelter one hen, and they ran in an irregular line, half a dozen in all.

Subsequently saw the hens' nests of this identical pattern in Boer farms. The type is very natural in a country where wood is very scarce.

The kraal was composed of a number of rounded huts and two or three oblong houses, small, one storeyed and of stone, with thatched roofs. It was very curious to see the native predilection for rounded corners, subdued (I suppose through white influence) in the case of the main structure ot these houses, appear again in the rounded mud wall or native fence of rough sticks or corn stalks which commonly marked off the court-yard of each house. The natives appear to lay great stress upon having a little yard of this nature in front of each hut, although no particular privacy is assured. I may add that Boer farmhouses not unfrequently possess courtyards of the same rounded shape. The farmhouse on the south side of Paardeberg Drift, which was used as a

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hospital, exhibited this peculiarity. Further, nearly every native kraal in this part of the country had two or three of these oblong stone houses.

The huts were rounded. The roof is not a true arch; it was rather of the shape, in a measure, of the back of a tortoise—first concave, then convex. The shape was beautifully true in every hut I remember noticing. The roof is set upon a very low wall little over a foot or eighteen inches high, I should say, and the doorway is very small, the door itself being of wood. Entrance must be made upon hands and knees, or, at all events, in a very stooping position. I was curious as to the manner of swinging the doors, but did not get an opportunity of examining one closely. Over the door is a prolongation of the roof. These huts were noticeably neat and clean, whereas the square-cornered houses with their thatched roofs presented a tumble-down aspect.

At this village I saw a woman rubbing native grown tobacco on a flat stone with a smooth and worn egg-shaped stone of a size to fit the palm of the hand.

At this kraal I bought the conical straw hat, (specimen No. —). These hats are kept on the head by means of strings, as in this specimen. I was struck with the curious fact that the native weavers do not provide holes for these strings. The strings must of necessity be forced through, injuring the texture of the work. And yet the hats cannot stay on without the strings, and the natives, so far as I observed, do not sew the strings on, as our milliners do.

4th May.—At a farmhouse a short distance south of Welkom Drift on the Vet River I observed a large rounded earthen pot, apparently of rude make, with a strip of rawhide, hair adhering, around the lip on the outside. Time did not allow for an examination. The natives here were Basuto.

9th May.—Bought at a Basuto kraal near Winburg a small girl's dress (specimen No. 22,125).

The bracelets which are extremely common in all of South Africa which I have visited, (viz. specimens Nos. 22,017-8) are of two main sorts;—(1) heavy, made of copper wire twined around (I suppose) telegraph wire; (2) light and far more artistic and elaborate, made of thin copper or brass (occasionally gold, I am informed) wire twined around a core of horsehair, and in consequence very flexible. The work often is excellent. It is done entirely by natives and I was subsequently informed that one tribe, the Shangaans (if the spelling be correct), dwelling in Portuguese East Africa, have the monopoly of the manufacture. Moses has assured me that no tribal variations occur and although patterns differ I never detected any preference according to tribe, such as exists in the case of beads. I have seen them of copper, of brass, of copper and brass wires alternating, and of copper with heavier rings of copper at intervals in the work. A Cape boy whom I employed as a driver for a couple of days told me that he had one which showed three colours of wire.

I subsequently was told that the Shangaan workman makes these bracelets by means of a flat stone and a horn. He makes the ring of horsehair of the required size and then, taking the wire, "crimps" it with the end of the horn upon the stone. He works rapidly, the wire coils and he draws it tigh

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around the core. A good workman can make one in a few minutes and they certainly are cheap. My standard price for them was sixpence and the natives seemed exceedingly willing to sell them at that price.

In this kraal I thought I saw a charm on a small boy's tiny apron (his sole garment). Moses, however, assured me that this was simply an ornament

26th May.—Bought to-day at a kraal near Wonderpan, about twenty miles south of Kroonstadt, the "Kaffir Handkerchief" (specimen No.) from an old Basuto woman. This implement (whose use I dimly recollect having seen alluded to by some African traveller, I believe Livingstone) is a small arrowheaded pewter implement, about inches long, which is used for picking the nose. Moses informed me that this is used by the old people alone. The natives regarded my desire to own this as a huge joke.

Attached to this implement was the circular brass blanket buckle (specimen No. 22169). This is native made and was these cond such implement which I had seen; in both instances they were used by old people. No distinction of sex is made, in the use either of this implement or "handkerchief." The mechanical idea involved in the working of this brooch is worthy of attention.

Corporal Cameron (to whom I refer later) was inclined to regard the "handkerchief" as a charm, or at all events as supposed to possess some magic powers. Its small size, its shape, like that of a miniature spear, and particularly the swelling in the middle of the "handle" were his reasons for thinking this. Against this must be set the fact that the people from whom I got it made no mention of its possessing any such use and appeared to regard it simply as an article of domestic convenience. The old woman who was the owner was reluctant to give it up, but found three shillings enough to induce her to part with it.

The pale blue beads attached to the "handkerchief" are peculiarly Basuto. Since Moses told me that this shade is appropriated by this tribe I have more than once identified native articles as Basuto, occasionally rather startling owners of "curios" by this simple bit of knowledge. The Basutos appear to have an aversion for red beads. The beads themselves I regarded as hailing from Birmingham, and the testimony of Moses confirmed me in this view.

I had noticed that native kraals seemed invariably (so far as my observations extend) situated some distance from the water. On this day I questioned Moses upon the subject and he assured me that this was intentional. The reasons, so far as I could extract them from him, are:

(*a*) Fear of malaria (suggested by myself, agreed to by Moses; obviously an unsatisfactory means of acquiring information.

(*b*) To preserve the children from the danger of falling in.

(*c*) To preserve the water from being fouled by the children.

The water, it must be remembered, is usually got from dams, i. e., artificial ponds, and is therefore stagnant. It may be crediting the natives with unusual hygienic knowledge to suggest that they take precautions to avoid making the water-supply worse than it is, but I cannot help recollecting in

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this connection the cleanliness of the Basuto and Barolong huts and kraals, so far as I observed them.

At this kraal I noticed from a distance a woman rolling something, possibly maize, more probably tobacco, upon a flat stone, which appeared worn smooth and hollowed out, and with a stone roller.

A frequent article in a kraal is a very rude gallows frame of two rough branches of trees set upright with a cross piece lashed eight or ten feet from the ground. I have been told that this is used for suspending slaughtered animals for skinning and cutting up. I often observed bunches of ears of of maize suspended from the cross-bars.

The kraal usually has attached to it a small quantity of cultivated land, in which maize, Kaffir corn, and similar grains, together with tobacco, constitute tbe staples. The husbandry of course is rude and the "garden," to use the rather odd South African term for these fields, is usually a forlorn-looking affair. The information I got from Moses led me to regard the natives in the late Orange Free State as in a condition of serfdom. I was informed that each big farm has upon it a kraal with a litttle population of Kaffirs, who rent from the farmer a bit of ground for their cultivation and grazing rights over a further portion. From them the farmer draws his labor supply. The natives may not leave the farm without a pass, and natives may not come upon a farm without the permission of the owner. Each kraal has its headman, who is responsible for the rent and who is the medium of communication between Boer and native.

May 29, 1900. At a small kraal at the 619th mile of the Orange Free State Railway, near Leeuwspruit, north of the Rhenoster River, I got a brass bangle, rigid, and of European manufacture. The woman who sold it to me asked me to put it on and grinned delightedly when I did so. I attributed this to coquetry, but Moses told me it was probably her pleasure at the condescension. He explained that the Boers often refuse to touch anything used by the natives. Later in the day I gave this to an old Boer who asked for a bangle (seeing my little collection) to cure rheumatism.

May 31, 1900. At a largish Basuto village close by Vereeniging, O.F.S., I bought largely of bangles, of a small wire type. Also an excellent bowl (since stolen) and two Kaffir beer strainers. These things were made of a small wiry reed which grows by streams. All were in use at the moment of buying. The bowl was of extremely solid and heavy construction and Moses stated that when it was wet it would hold water. The two strainers (specimens 22,112-3 in the Museum) are of differing patterns and it is important to remember that I bought them in the same village, from the same people, so far as I can recollect.

A woman with her hair "done up" in straight tufts, with bits of grass for curl-papers, acted as intermediary, as she knew a little English and had the requisite size, lungs and chest. When the buying languished she coolly demanded her "per cel," i.e. percentage—commission. I was amused, but Moses assured me that in Johannesburg this habit is universal. I presume that this has been introduced by the Asiatics, who are very numerous there.

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These people, living on the outskirts of a village (devoted to the mining industry), were very noisy and forward, with manners far worse than those of the rural natives.

In this connection I may add that I found the manners of the Kaffirs in their kraals distinctly good. While the transport natives were a cheeky lot, much spoiled by their contact with the soldiery, their cleanliness struck me. At any river where the army halted they could be seen in numbers not only bathing, but soaping themselves for a good wash. Their personal habits, on the whole, seem to be modest.

May 31. At a small place called Smaldeel, 8 miles north of the Vaal, where the plain of the Vaal ends and the Rand begins, I visited a farm tenanted by a number of Basutos of the Maoa (?) clan. They have two perpendicular marks on the cheek as a clan mark. The clan mark which I most frequently saw were three straight lines radiating from the corner of the mouth.

This was a very rich farm and the buildings were extensive and scrupulously clean. The houses were of the usual oblong, thatched type, with extensive court yards, floored with hardened red clay, and with walls some six feet high apparently of the same hardened red clay. These courts were piled high with forage (manna, etc.), mealies (i.e. maize), Kaffir corn, etc. The hard floors were extremely clean. The cleanest farmhouse I have seen here. Everything betokened rude wealth. The outhouses were numerous and crammed with produce. Cattle were fairly numerous. Pigs, chickens, dogs, etc., abounded, and despite the troubles of the land a good pony was in one stable—which the owner rather reluctantly sold to me for £8. Part of the farmer's property was a big farm waggon. We conjectured that this farm was rented from some Boer.

June 1. At the Klip River Hotel (also known as Olifant's Vley and Eikenhof) I was given an assegai, made by the Red Kaffirs, a tribe whose habitat is stated to me as near King Williamstown and Grahamstown, in Cape Colony. The most noticeable characteristic of this weapon is the spoon shape of the blade. I am informed that this spoon shape is universal, each tribe having its own variation. The purpose, evidently, is to set up a twisting motion, so as to increase the range.

This is a stabbing assegai. The proper throwing assegai has a very slight shaft about six feet long. The native, in preparing to throw the assegai, gives a peculiar wrist-twitching motion which, it is said, no white man can acquire. This sets the whole shaft vibrating which, with the rotary motion set up by the spoon shape on the blade, gives it range. The transport Kaffirs on several occasions threw this assegai about thirty yards. They told me that the natives in the kraals practice throwing the assegai daily.

It may be added that the natives in the Dutch republics were forbidden to possess assegais.

Further, I was told, that the natives are abandoning the use of assegais and making greater use of knob-kerries and battle-axes in the fights which they have with each other.

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June 23. The natives in the compound at Elandsfontein are (a railway junction ten miles east of Johannesburg) of the C'unquaaun (pronounced Chunkun, so far as my ear could make it out) tribe—practically Zulus. They were Zulus until about twenty-five years ago, when they branched off and settled in Portuguese East Africa. From them I got a knob-kerry, the wiring on which is undoubtedly Zulu work, and of good quality; also the eating dish, 22,204, small blue and black necklace, etc.

Captain S. Maynard Rogers (D Co., R.C.R.) gave me the harp, which he procured at the compound belonging to the Brakpan Colliery, six or eight miles east of Boksburg. I do not know the name of the tribe to which this belongs.

June 24. The pipe (22,131) was made by the M'Kosa (Cape Colony) Kaffirs. I bought it at Elandsfontein from a Kaffir who had just been smoking it.

The "necklace," or rather, leg-bangle (22,128) of blue and black beads is of C'unquaaun make. I bought it from a native in the Elandsfontein compound. Moses assured me it was worn simply as an ornament. Corporal Cameron of Lord Loch's Horse, who was retained for a while as interpreter to the Intelligence Officer at Springs (Captain Ogilvy, Adjutant, R.C.R.) gave me a rather interesting reading of its significance. According to him it answered to an engagement ring among white people. He said that probably the beads were bought by the young man and worked up by the young woman. Within each of the little square "cushions," he said, would be found a pinch of sand or dust, intended as a charm to protect the wearer. From the varieties of beads worn and the arrangement he said he could identify the tribe (C'unquaaun), the lady's family (which was highly placed), her social status (which was excellent), etc. He even went so far as to deduce from the tiny pink beads on the loose-flying horse-hairs just how far away was the wedding day—about six months from the date of the making of the ornament.

Corporal Cameron assured me that fashions rule quite strongly in the native world. I had observed the fondness of the Basutos for pale blue beads, and the natives seem to have tribal preferences; but apart from this fashions seem to come and go. Corporal Cameron, who had been a peregrinating trader among the natives, told me an anecdote to illustrate this. It appeared that on one occasion he reached with his waggon-load of wares a certain Zulu tribe. He had supplied himself with pink beads, and found on arrival that pink beads were out of fashion and a variety of white bead was all the rage. The pink beads were unsaleable and he could not supply the demand for white beads, with which he was very scantily supplied. He was fairly in despair when the feminine portion of the family of a chief induna (or head man) came to inspect his wares. He made shift to give them the white beads which they asked for, as they were of great social consequence, and then with a fine flourish of compliments presented them with a quantity of the despised and rejected pink beads, about a pound's weight. It being a present the ladies accepted the pound of beads; and having them, they worked them

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up into some sort of ornament. Soon some species of social function took place at which these ladies appeared in this bead-work. They were the local social leaders, their appearance set all the other ladies on the *qui vive* to follow the fashion—and Cameron sold all his pink beads at a profit.

Cameron added some details to my personal observations upon the making of snuff. When the native tobacco is rubbed to a powder, he informed me, the native women are fond of adding a little gin, making a paste, and allowing the gin to evaporate. The strength of the resultant snuff may be imagined. He added that when gin is not to be had a more easily obtained liquid is sometimes used.

Cameron gave me specimen No. 22,127, a necklace made of alternate pieces of sea-shell and wood, the latter probably the Mpani or Mopani, a species of mahogany, from which most knob-kerries are made. The comb was attached by a bit of leather thong and was in active use when the specimen was got by Cameron from its native owner. It comes from Portuguese East Africa—(further information I could not get). Evidently, however, the maker lives near the sea-shore.

A small necklace which I obtained at Elandsfontein, which was subsequently stolen, was small and plain, but in some respects similar to the blue and black ornament already mentioned. It was composed of three small square "cushions" extremely similar to those of the bigger ornament, and composed of much the same sort of beads; it had no loose horse hair or flying beads. It was strung upon a strand of horse hair and two of the "cushions" were separated from the third by a peculiar knot, very much like that in specimen No. 22,126, the bits of ivory carved to represent claws. Cameron stated that this was probably a necklace given by an elderly woman to a young man, presumably her son, upon the occasion of his leaving home. The one cushion represented the wanderer, the two or three the family, the knot the dividing distance.

I am unable to say whether the ivory necklace mentioned in the foregoing paragraph has any such significance or not. Neither do I know to what tribe its original owner belonged.

The "doppy," (22,116), is a well-known and very peculiar article of attire, affected by the Zulus.

I was told that sometimes these articles are made of grass and are flexible.*

The snuff-box (22,124) is Zulu, or C'unquaaun. It is made from the hardened rind of the Mahobohobo, a species of fruit. The eating dish (No. 22,204), was being used in the compound ten minutes before I bought it.

It is worth noting that the "boys" in the compounds are forbidden to bring weapons in with them. The assegais, battle-axes, etc., which we pur-

* Lieut. Geo. E. Laidlaw informs us that doppies may be purchased as articles of merchandise, in country stores, and that the doppy is worn mainly on account of the prevalence of insects.—D.B.

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chased at Elandsfontein, Springs, etc., were, I am convinced, quite new; the knob-kerries and shields may have been taken in with them.

At the colliery at Springs I visited the compound. Four tribes were represented, the Machopis, from the east coast, the M'Nyambaans, from the east coast, the O'unquaauns and the Shangaans. Among the objects which I noticed was the apparatus for a native game. Three rows of holes are dug a couple of inches deep and from four to six inches square; about fifteen holes are in each row. Two natives will sit opposite to each other at this set of holes, like chess players, and move bits of stone from one hole to another. The compound manager asserted that no white man had ever mastered the principles of this game, and it appears that the natives will play at it for an indefinite period.

The folowing miscellaneous notes on the Zulus may prove interesting with respect to a people so recently brought into some prominence in connection with the presence of our "boys" in Africa:

Lord Lubbock says they can carve fair representations of animals and plants, and are fond of doing so, but they have great difficulty in understanding drawings, and perspective is quite beyond them. They are backward in matters of art, but are not altogether deficient in the idea. "Their idols cannot be called indeed works of art, but they often not only represent men, but give some of the African characteristics with grotesque fidelity."

"Among the Bachapin Kaffirs, those who have distinguished themselves in battle are allowed the privilege of marking the thigh with a long scar, which is rendered indelible and of a bluish color by rubbing ashes into the fresh wound."

Lichtenstein says he could not discover that the Koosa Kaffirs had any word for eight; that few of them could reckon beyond ten, and many did not know the names of any numerals, yet if a single animal was missing out of a

[NOTE.—In "Fifty Years in South Africa," a vivaciously written book by Mr. G. Nicholson, occurs a curious biographical note of which I am reminded by my reference to the native method of tanning. Mr. Nicholson went to South Africa in 1844 and held a distinguished place among the many great sportsmen whom that land has known. On page 168, in speaking of Mr. Krüger, Mr. Nicholson says:—

In his younger days Paul was a "mighty hunter before the Lord," and flourished exceedingly on the profits made by the extensive tanning work he was skilled in. Game of all kinds abounded near his large estate in the Rustenburg district, and any quantity of hides was easily obtainable, as were also bark and other necessary articles. On this estate several hundred Kaffirs, under a headman named Kamian, were located and educated so far as to know that they were to perform all the varied duties of Gibeonites to the utmost endurable limits. These people were not ruled with rods of iron, and I never heard that whips of scorpions were employed to discipline them, but other instruments made of rhinoceros or hippopotamus hide are very effective persuaders when wielded by muscular Boers, and the muscle and the whips were always to hand when requisite. Gibeonites and black ones at that, generally had to put up with a good allowance of "Sambok" in those days, especially at the hands of the élite of the puritanical pietists, whose principles and practices were then in the ascendant. Kamian and his people at last got tired of this sort of thing; suddenly fled over the Marico, in a body, locating themselves very comfortably in a suitable place, where the tribe still lives in peace. Soon after this Kaffir exodus Paul began to take an active part in the curious politics of the country . . ."]

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herd of several hundred they noticed it at once. To them, "talitsupa," or six, literally means "take the thumb;" that is, having used the fingers of one hand for five, take the thumb of the next. "The numbers," he proceeds, "are commonly expressed among the Beetjuans by fingers held up, so that the word is rarely spoken; many are even unacquainted with these numerals and never employ anything but the sign. . . . . I could by no means arrive at any denomination for the numbers five and ten. Beyond ten even the most learned could not reckon, nor could I make out by what signs they ever designated these higher numbers."

Many tribes believe that everything has made itself, and Canon Callaway, in The Basutos, declares that the Zulus are destitute of any notion of creation. Casalis, another traveller, came to the same conclusion. He says: "Those whom we questioned on the subject have assured us that it never entered into their heads that the earth and sky might be the work of an Invisible Being."

Canon Callaway states that a Zulu told him the people did not try to find out reasons for things, and the Rev. Mr. Moffat declares that they were wholly destitute of "theological ideas."

In "Faiths of the World," by Dr. Gardner, we read "From all that can be ascertained . . . it seems they have no idea of a Supreme Intelligent Ruler of the universe." Another writer tells us that some of these people thought white men made the world, and when Moffat tried to explain to a chief the nature of God, the chief said, "Would that I catch it! I would transfix it with my spear."

Dreams and shadows give them some idea of invisible beings, and "they have a curious idea that a dead body casts no shadow."

They blame the spirits of recently deceased and discontented ancestors for causing diseases, but this seems to be about the only power attributed to the defunct. Sometimes the dead, or amatongo, are supposed to reappear as snakes, in which case a bullock may be killed and part of it put away for the use of the dead.

Lord Lubbock quotes Mr. Casalis as saying, after a residence of twenty-three years in South Africa, "that morality among these people depends so entirely upon social order that all political disorganization is immediately followed by a state of degeneracy, which the re-establishment of order alone can rectify," and Lubbock adds: "Thus, then, although their language contains words signifying most of the virtues, as well as the vices, it would appear from the above that their moral quality was not clearly recognized; it must be confessed however, that the evidence is not very conclusive, as Mr. Casalis, even in the same chapter, expresses an opinion on the point scarcely consistent with that quoted above."

The general belief respecting the character of the Zulus and their congeners corresponds more or less to that of Mr. Hamilton as given in his notes preceding.

Physically, the Zulus are among the best of the human race, and in appearance they are, as a rule, pleasing.

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BIBLIOGRAPHY OF THE ARCHÆOLOGY OF ONTARIO.

Third Collection.

By A. F. Hunter, M.A.

The following list of references to literature upon the aborigines of Ontario continues the work of two previous instalments—the first in the Report for 1896, the second in that for 1897. As we stated in connection with the former instalments, these lists are not exhaustive, but are intended to direct the student of archæology where he will find literature on the particular branch of the subject he is pursuing.

Scattered throughout the pages of books on Canada, there are to be found large numbers of instructive passages bearing on special features of Indian life and customs. In fact, only a small portion of the literature of the Indians is to be found in books and articles specifically devoted to that subject. A guide to where some of these may be found will be useful, and this Third Collection consists partly of such references.

Besides these, it includes some interesting features of the relations of the Indians to their white successors, such as:—copper mining at Lake Superior, the evolution of "Trespass" roads from Indian trails, and the education of the Indians. What is known as "New Ontario" receives a fair share of attention. It also contains a considerable number of newspaper references. Many paragraphs lie buried in the files of local newspapers, and though often valuable, are difficult to find without some reference list.

Abbott. C. C.

Primitive Industry.

At p. 173, he describes and figures (fig. 155) a whole clay pot from near Wiarton, Bruce Co., Ont., found under a cliff, 100 feet high, at Colpoy's Bay.

Beauchamp, Rev. Wm M.

Aboriginal chipped stone implements of New York. State Museum Publications, Vol. iv, Bulletin No. 16. Albany, 1897.

Refers to places (p. 13) in Welland Co., across the Niagara River from Black Rock in Buffalo, where blocks of hornstone had been detached by the aborigines.

Polished stone articles used by by the New York aborigines. Bulletin of the N. Y. State Museum. Vol. 4, No. 18 (Nov., 1897.)

Has references to some Ontario relics.

The Antiquarian, (Columbus, O.) 1897. 1303, 185, 249.

Remarks on certain relics from Ontario.

Bell. Robert, B.A.Sc., M.D., LL.D

Annual Report, Canadian Geological Survey, vol. 5, (Part I.), 1890-1. Report F, Appendix iv.

P. 91 Meanings of 46 Indian geographical names in the country around Sudbury, Ont.

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Bigsby, John J , M.D.

The Shoe and Canoe, or Pictures of Travel in the Canadas.

Dr. Bigsby made a tour of the Lake of the Woods in 1823 as secretary to the Boundary Commission. His memoirs were not written until 1850.

Vol. II, p. 273, fur traders' expedients for preventing a rival from entering a rich fur country—the extermination of every animal.

Blue, Archibald.

Fifth Report of the Bureau of Mines, 1895. Toronto, 1896.

Section III., p. 110. Alex. Henry's description of Caribou Island (1771), and tradition of enormous snakes there; p. 114, description of a skeleton found by Dr. Coleman (see p. 74) at Lac des Mille Lacs; pp. 115, 134, Chief Peter (a photo of whom appears in the Sixth Report) of Poplar Point Reserve, and native customs; p. 138, Legend and origin of the name of Windigoostigwan Lake, and cannibalism there (see also Keating, Wolseley, Henry); p. 162, Fort St. Pierre, named in honor of La Verandrye, and the Coutchichin Indian reserve; p. 165, copper spear-head found on the Rainy River.

Section IV, (a paper by Archibald Blue read before the Hamilton Association January 16, 1896.) pp 196-201, the Human History of New Ontario, with references to the aborigines. P. 209, earliest attempt at copper mining by white men, on the Canadian shore of Lake Superior, in 1770. (1771 ?)

Notes on Skulls. Proc. Can. Inst. Vol. II. (1901), p. 95.

Describes skulls found within the earthworks near Clearville, Kent county.

Borron, E. B.

Report of the Royal Commission on the Mineral Resources of Ontario. (Toronto, 1890.)

In the evidence of Mr. Borron (p. 92) he mentions that the only Indian copper diggings of remote times, known to him on the north shore of Lake Superior, are at Cape Mamainse

Borron, E. B—*Con.*

and upon Isle Royale. Again, at p. 98 refers to the Indian digging at Point Mamainse.

Boyle, David.

Archæological Report for 1897. Appendix to the Report of the Minister of Education, Ontario. 87 pp., 52 illustrations. Toronto, 1898.

Presentation, p. 1; additions to the museum, 3-15: methods of working, 15; drill rest, 16; clay pipes, 17; stone pipes, 21; stone discs, 22; bone specimens, 23; shell work, 24; copper, 25; textile work, 25; medicine mask, 30; brass tomahawk, 31; the Jesuit (?) stone, 32; stone tool work, 33; recent primitive pottery, 34; Christian Island, 35-42; Brantford township 42-3; Malahide township, 43-4; Orillia township, 44-5; old maps, 46-9; Balsam Lake and vicinity (with three ground plans of villages), by Geo. E. Laidlaw, 50-65; Bibliography of the Archæology of Ontario, Second Collection, by A. F. Hunter, 67-87.

The Primitive Tribes of Canada. Toronto *Evening News*. Sept. 24, 1898.

A two-column article on their tools and weapons, with special reference to those of Ontario.

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The Pagan Iroquois, 54; Pagan conditions, 56; old time Paganism, 58; Recent Indian Religions, 62; Ska-ne-o-dy-o and Iroquois Paganism, 75; Mid-winter Festival, 82; Burning of the White Dog, 91, Scattering of Ashes, 106; Opening Speech, Mid-winter Festival, 115; Cayuga Spring Sun Dance, 117; Seneca

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Spring Sun Dance, 121; Green Corn Dance, 124; Peach Stone Game, 126; Feast of the Skeleton, 128; Opening Festival Address, 130; Children's New Year Treat, 135; the Word "Niyoh" (God), 136; Pagan Hell, 137; Spraying of Heads, 139; Dream Interpretation, 142; Iroquois Music (with notes by Alex. T. Cringan), 143; Society of the False Faces, 157; Some Myths, 160; Mixed Blood, 167; personal names, 168; place names, 171; Iroquois gentes, 173; chiefship, 175; dress, 179; dwelling-houses, 180; fellowship, 180; marriage and separation, 183; Death Customs, 184; A Chief's Death, 185; Council Meetings, 186; Maize as Food, 187; Disease Among the Iroquois, by Dr. R. H. Dee and Dr. L. Secord, 189; Archæological Notes, Victoria county, by G. E. Laidlaw, 196-202. Appendix (A), Delawares, 203; (B), List of Indian Dances, 205.

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Chadwick, E. M.

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Connelley, Wm E.

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Cringan, Alex T.

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Dawson, Sir Wm.

Canadian Naturalist and Geologist. March, 1857, pp. 3-9.

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Dee R. H., M.D.

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Farmer, Miss E. Yates

The Six Nation Indians. Toronto *Globe*, March 5, 1898.

With 10 illustrations.

Fessenden, Rev. E J., B.A.

Niagara on the Canadian Shore. Transactions of the Wentworth Historical Society, vol. 2, (Hamilton, 1899), pp. 38-48.

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Galt Reporter.

Nov. (?) 1859.

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Gerin, Leon.

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Grant Rev. Geo M.

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P. 18; Opinion of Rev. Mr. Hurlburt, Methodist missionary at Manitoulin Island, that there was little, if any, difference in morals between the Christianized Indians around him and the 200 or 300 pagans. Pp. 47-9; The Ojibbeways of Fort Frances, Rainy Lake. P. 60. Failure of Mr. Simpson to make a treaty with them in 1872, and the causes. P. 69; Cree willingness, and Ojibbeway obstinacy, to become Christianized. P. 190; Description of 'sweating booths,' and the ceremonies connected with them.

Harvey, Arthur

Proceedings of the Canadian Institute, Third Series, vol. vii, (Toronto, 1890.)

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The manuscript journals of Alex. Henry and of David Thompson. New York, 1897, 3 vols. Edited by Elliott Coues.

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Hind, Henry Youle, M.A.

Reports of progress on the North-west Exploring Expedition. Toronto, 1859.

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Vol. II (Toronto. 1894) pp. 122-124, Indian School. River Credit ; pp. 348-351, Education of the Indians in Upper Canada ; p. 349, Notice of Capt. T. G. Anderson, Superintendent of Indian affairs, and his work ; p.350, Cession of the tract lying along the northern shore of Lake Ontario, from Kingston to Lake Erie, by the Mississaguas at a Council Meeting held by Sir John Johnson, in 1787, at the Carrying Place, at the head of the Bay of Quinte ; Credit treaty, (1806).
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Contains 280 new titles being in continuation of the list given in the report for 1896.

Hunter, A F, M A —*Con.*

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Vol. 16 (1898) Weanohronons (p. 259).
Vol. 17 (1898) Taenhatentaron pp. 241-2).
Vol. 18 (1898) Ouaouechkairini (p. 258), Kinounchepirini (p. 258), Timiscimi (p. 259), Oumisagai (p. 259), Baouichtigouin (p. 259), Aondironon (p. 260), Ongmarahronon (p. 260), Oneronon (p. 260).
Vol. 19, p. 269, Ste. Marie on the Wye (with sketch map) ; 32 villages. p. 271, St Louis, Ste. Anne, St. Denis, St. Jean, St. Francis Xavier, St. Charles.
Vol. 20, p. 305, St. Jean Baptiste, St. Joachim, Ste. Elizabeth ; p. 307, St. Peter and St. Paul ; p. 308, St. Jean, St. Mathias, St. Simon and St. Jude.
Vol. 21, p. 316, Kandoucho ; p. 317, Tsohahissen's village, Teotongniaton (St. William).
Vol. 23. Four mission villages, Nadouessis.

Notes of sites of Huron Villages in the Township of Tiny (Simcoe County) and adjacent parts. An Appendix to the Report of the Minister of Education. Toronto, 1899. 42 pp. With map and 17 illustrations.

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Hunter, A. F., M.A.—*Con.*

Prepared with a view to the identification of those villages visited and described by Champlain and the early missionaries. Remains of forty-nine villages are described and twenty-four bonepits.

Notes on sites of Huron Villages in the Township of Tay (Simcoe County). Appendix to the Report of the Minister of Education. Toronto, 1900. 36 pp. With 4 diagrams and 3 cuts.

This was printed separately and as pages 51-82 of the Archæological Report for 1899. The sites of 46 villages are described.

James, C. C., M. A.

The development of Agriculture in Ontario. Appendix to the Report of the Ontario Bureau of Industries, 1896. Toronto, 1898.

At p. 30, notes that the first settlers travelled overland by the Indian trails and that the earliest roads followed these trails, "being straightened and improved in after years." Note (13) on this passage reprints comments on the same subject. (See A. W. Campbell, C. E.)

(See also under *Napanee Beaver*.

Kearney, Rev. L. C

Origin of the Indians, pages 164-165 in the Archaeological Report for 1899. (Toronto, 1900).

Assigns to them a Hebrew origin.

Keating, Wm. H.

Narrative of an Expedition to the source of the St. Peter's River in 1823.

Vol. II., p. 128, cannibalism among the Oschekkamega band of Indians, near Cannibal or Wendigo lake.

Kelly, Dr. M. J

In "Documentary History of Education, Upper Canada." Vol. I., Toronto, 1894. pp. 331. (By Dr. J. G. Hodgins.)

At p. 39, gives a sketch of the New England Company, or School Society and the opening of schools among the Six Nation Indians of the Grand River in or before 1827.

Ketchum, Wm.

Memoir of Capt. Joseph Brant. Brantford, 1872.

P. 97, the war dance; p. 99, the "serpentine dance," reprinted from Campbell's Travels. This book was issued anonymously, but is known to have been written by Wm. Ketchum.

Laidlaw, Geo. E.

Remains in Ash Beds at Balsam Lake. The American Antiquarian, Vol. XIX., pp. 271-275. (September and October, 1897).

Fourth Paper in the Series—"Aboriginal Remains of Balsam Lake." It classifies ash-beds into two kinds—'carried' and 'undisturbed'; gives the relative frequencies and positions of relics in each kind of ash-bed; with a page of cuts (ten) of pottery fragments from Balsam Lake. An additional plate of illustrations containing 19 figures and belonging to this article, appears in Vol. XX., No. 1.

Miniatures, or Diminutive Relics. American Antiquarian, January and February, 1898. Vol. 20, No. 1.

Describes and compares diminutive relics—axes, chisels, arrowheads, pots, pipes, rings and beads—from Ontario with those from other places. Has 1 plate, 22 wood cuts of relics, of which 13 are from Ontario. The figures of pipes, pots, ring and bead, celts, chisel, arrowheads, are given in their natural sizes.

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Laidlaw, Geo E.—*Con.*

Horn Relics in Ontario. American Antiquarian. March, April, 1898. Vol. 20, No. 2, p. 65.

With 3 pages (20) illustrations. The article surveys the subject, with 20 examples.

Balsam Lake and vicinity. pp. 51-65. Archæological Report for 1897. (Toronto, 1898).

This article describes village sites recently examined, with ground plans of three sites described in former reports.

Archæological Notes, Victoria County; pages 196-202 in Archæological Report for 1898. (Toronto, 1898).

This article describes relics obtained and sites and pits visited during the season of 1898.

Some copper implements from the midland district, Ontario; pp. 83-90, Am. Antiq. March and April, 1899. Vol. 21.

General remarks on copper implements followed by figures and descriptions of eight relics found (with one exception) in the Balsam Lake district; cuts of five other Ontario copper relics are shown, but not described; also a plate showing three groups (nineteen relics in all) of copper implements from the great lake region, viz., (1) Wisconsin, (2) Brockville, Ont., (3) Southern Ohio, for purposes of comparison, without descriptions.

American Archæologist Vol. 3, Part I. Jan. 1899. Columbus, O.

Letter giving figures and descriptions of two relics from Balsam Lake, Ont—(1) stone pipe, (2) horn comb.

(North) Victoria County, pages 41-50 in the Archæological Report for 1899. (Toronto, 1900.

Laidlaw, Geo. E—*Con.*

Describes new sites examined during 1899, and gives particulars of the specimens donated to the museum in the year.

Latham, R.G., M.D.

The Ethnology of the British Colonies and Dependencies. London, 1851.

Includes Ontario.

Lefroy, Capt J. H.

On the probable number of the native Indian population of British America. Canadian Journal (First Series), Vol. I. pp. 193-198.

An exhaustive paper on this subject read before the Canadian Institute, May 1, 1852.

Lindsay Post

Sept. 30, 1898.

In Fleetwood correspondence a notice of the discovery of an Indian skeleton appears.

Lindsay Watchman.

Sept. 30, 1897.

Paragraph noticing the finding of a flint arrow head and a large number of lead bullets, imbedded in a log and struck by the saw in the Lakefield, Ont., mill. The ring marks showed them to have been there nearly 20) yrs.

Lizars, Robina and Kathleen M

In the days of the Canada Company. (Toronto, 1896).

P. 96, descriptions of three kinds of Chippewa canoes, formerly in use at Goderich—birch-bark, dug-out, and the elm canoe; p. 97, methods of making fancy work in vogue among Chippewa squaws; p. 97, ancient Chippewa burying-ground on the shore of Lake Huron, Colborne Township; p. 115, discovery of a feld-spar vase at Goderich; p. 400, Indian trail near Goderich, and burying ground near Owen Sound; p. 426, Indian grave on the site of Stratford; p. 435, an early Indian camping-ground at Stratford (about the year 1830).

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McAinsh, John M.

The Aborigines. St. Marys *Argus*, June 23, 1898.

No, 2 in the series of articles "The Old Pioneer Days of Nissouri," treats especially of the Munceys, who occupied that district when Europeans first settled there about 1820. Describes also relics found in the vicinity of Little Lake, East Nissouri, Oxford Co.

McGregor, Dr. J. A.

Lake Medad and the Kwin hi-bi-hah collection of Indian relics.

A lecture to the Hamilton Association during the year ending Apr. 30, 1897.

McKenzie, Sir Alexander.

Voyages from Montreal to the frozen ocean, 1789. Original edition, 4to , London, 1801.

At p. liv., in his account of the route from Lake Superior to Rainy Lake, he explains the name of "Rock in Arrows" on Lac la Croche or Crooked Lake—'into one of the horizontal chasms of the rock a great number of arrows have been shot.' The explanation then follows.

Mason, Otis Tufton, A. M., Ph. D.

Woman's Share in Primitive Culture. New York, 1894.

This work describes generally the occupations of aboriginal women, especially those of North America. No references to Ontario Indians, as such, appear; but the following concern the tribes in the province: p. 33, resemblance of Algonquin and Eskimo steatite pottery; p. 44, the basketry of Algonquin tribes; p. 99, most pottery north of Mexico is constructed by coiling; p. 106, the production of black pottery ware by 'secondary burning' or smudging to dye it a permanent black (a practice followed to some extent among the Hurons); pp. 144-5, the fireproof qualities of soapstone, used for tobacco pipes,

Mason, Otis Tufton, A. M., Ph D.—*Con*

etc.; p. 237, women's buckskin skirts, among central North American tribes, of full length; p. 240, tracts of land used for communal cultivation among the Wyandottes; p. 252, the lighting of fires upon the graves of the dead, among Algonquins (quoting Yarrow

Milton and Cheadle

The North-west Passage by Land. By Viscount Milton, F.R.G.S., F.G.S., etc. and W. B. Cheadle, M.A., M.D., Cantab., F.R.G.S. Eighth edition, 1875.

P. 118, the construction of the Cree language which extends into Western Ontario; absence of the consonants d, f and l from the Cree alphabet; p. 122 some words identical in Cree and English.

Montreal Daily Star.

Feb. 26, 1898.

Article, "Street Tablets in Montreal," (p. 5) includes notice of the site of Hochelaga and relics found there.

Moore. Clarence B.

Certain Aboriginal Mounds of the coast of South Carolina. Philadelphia, 1898.

At p. 149 notices earthenware discs found in S. C. and as far north as Balsam Lake, Ont., where G. E. Laidlaw has met with great numbers in ash beds.

Murray, Hugh, F R S.E.

Historical and Descriptive Account of British America. Edinburgh, 1839.

Among other things it deals with "the manners and present state of the aboriginal tribes."

Napanee Beaver.

Oct. 26, 1900.

Enquiry as to the camping ground where Champlain spent the first five weeks of the winter of 1615 16. The opinions of T. W. Casey and

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Napanee Beaver.—*Con.*

Dr. Beeman favor Mud Lake or Varty Lake in Lennox and Addington county as the probable scene of the sojourn.

Nov. 16, 1900.

Enquiry by C. C. James, M.A., deputy Minister of Agriculture, Ontario, as to Champlain's camping ground in the country north of the Bay of Quinte.

Orillia Packet.

May 19, 1898.

Notice of a sword blade found in Medonte township, Simcoe Co.

Ottawa Free Press.

September 10, 1898.

Article describing the discovery of seventeen skeletons on an island in Lake Deschenes, near Aylmer on the Ottawa river.

Peet, Rev Stephen D.

Bone Age in Europe and America. No. 6, Vol. XIX., American Antiquarian (Nov. and Dec., 1897.)

Compares bone relics from Ontario ashbeds, as described by G. E. Laidlaw, with relics from bone caves in Europe. Refers to the Hochelagans (Dawson) and hunter tribes of Canada (Ontario), comparing them with the bone cave men of Europe.

Peterborough Examiner.

Oct. 29, 1898.

Notices of some of the curios in the Victoria Museum, Peterborough, including a number of Indian relics found in the district.

Jan. 25, 1899.

List of contributions to the Victoria Museum, Peterborough, including some Indian relics.

Powell, Major, J W.

Abstract, etc., Anthrop. Society, Washington, 1881, p. 84.

Proprietary rights of women among the Wyandottes.

Rau, Charles.

Prehistoric Fishing (in Europe and America). Smithsonian Contributions to Knowledge.

P. 268, *et seq.* give extracts from Champlain, Sagard, Le Jeune, etc., on the modes of fishing, nets, etc., used by Hurons and Algonquins; also describes the 'marriage to the nets.'

St Marys Argus.

Oct. 18, 1900.

Notice of a slate relic found on the 14th con., West Zorra (Oxford Co.) by Louis Ray.

St. Marys Journal.

Dec. (?), 1899.

Notice of a visit by L. D. Brown, of Granthurst, to a prehistoric Indian fortification on the farm of Mr. Jackson, 5th con., South(?) Dorchester. Description of the site. Reprinted in London (Daily) *Free Press*, Dec. 5, 1899. (Compare Archæl. Report, 1894 5, p. 38.

Scadding, Rev Henry, D.D.

The Toronto Landing. A paper read before the Society of York Pioneers, Nov. 4, 1890. (Toronto, 1891). 8 pp.. Reprinted from *Canadiana* and the *Week*.

Discusses, at some length, the meaning of the Indian word 'Toronto'—'a place of meeting'—the word having been originally applied to the district between Lake Simcoe and Lake Huron (*i.e.*, the Georgian Bay portion) and also to Lake Simcoe itself (Charlevoix). The landing-place at the present city was designated 'Teiaiagon,' a term also applied to the site of Port Hope.

Schoolcraft, Henry R.

Notes on the Iroquois (1846).

Has references to Ontario.

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Schoolcraft, Henry R—*Con.*

History, Condition and Prospects of the Indians of the United States. 1851. vol. I, pp. 68, 102.

Contains references to bonepits in Beverly township, 12 miles from Dundas, found "about the year 1837."

Secord, L, M D.

Disease among the Iroquois, pages 190-194 in the Archæological Report for 1898, (Toronto, 1898.)

Dr. Secord is medical officer to the Six Nations Indians.

Simcoe Reformer.

Aug. 9, 1900.

An article describes an outing of the Norfolk Historical Society for the purpose of examining the spot on Black Creek near Port Dover, which it has been suggested may have been the winter quarters of Dollier de Casson and Galinee in 1669-70.

Souter, T W. Edwin

Ottawa Citizen, Feb. 22, 1899.

Brief abstract of paper on "The Archæology of Lake Deschenes" read before the Ottawa Field Naturalists' Club, Feb. 21.

The Ottawa Naturalist, March 1899. Vol. XII. No. 12, p 268.

Abstract (7 lines) of Mr. Sowter's paper on "The Archæology of Lake Deschenes."

Archæology of Lake Deschenes, (Ottawa River). The Ottawa Naturalist, January, 1900. Vol. VIII., No. 10, pp. 225-238.

With 3 plates, (37 figures) of relics. The essay has notices of the flints and other implements of the aborigines of the Lake, their burial places (both communal and isolated), their fictile and textile work. A trail to the Gatineau, from the Lake, is also noticed.

Spencer J. W, A M., Ph D, F G S.

The Duration of Niagara Falls and the History of the Great Lakes. 2nd edition. New York, 1895.

Pp. 34, 44, 74, Ancient lake beaches used as trails by the aborigines, p. 45 the "Iroquois Beach" named after the aborigines who used its gravel ridges as trails, pp. 64, 65, used by the Algonquins, of the ancient shore-line named after them, as trails.

Sulte, Benjamin

The War of the Iroquois, pages 124-151 in the Archæological Report for 1899. (Toronto, 1900.)

Translated from the French by Mrs. Mary E. Rose Holden.

Tasker, L H., M.A.

The U. E. L. Settlement at Long Point, Lake Erie. Vol. II. Ontario Historial Society Papers and Records. Toronto, 1900.

Notices (at p. 33) the wintering place of Galinee's party, (1669-70). The writer, on the information of J. H. Coyne, B. A., of St. Thomas, places this site on Black Creek, where it joins the River Lynn (near Port Dover). Has photogravure of the place.

Thompson, David.

Extract from his journal. Third report of the Ontario Bureau of Mines, 1893, p. 63.

Notice of the early Indian quarries of native copper at Point Mamainse, Lake Superior, the information about which Thompson received from Indians in 1798.

Toronto Evening News

Oct. 4, 1898.

Despatch dated 'Kingston, Oct. 4.' describes three skeletons and many relics found on lot 17, 1st con. of Pittsburg Township.

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Toronto Evening Telegram.

Apr. 1, 1893.

Correspondence between Wm. Bell, teacher of the Mohawk school, Bay of Quinte, and the Rev. Dr. Stuart, 1796-1800, in regard to this school. Reproduced in Documentary History of Education, Upper Canada, vol. I. (Toronto, 1894), p. 37.

Toronto Globe.

June 18, 1898.

A despatch dated 'Deseronto, June 17,' gives an account of U. E. Loyalist excursion to the Mohawk reserve at Deseronto, with some account of these Indians.

Toronto Mail and Empire.

Nov. 20, 1897.

Notice of the discovery of a human face(?) turned to stone, on the Saugeen River, at Maple Hill, near Walkerton, Ont.

Sept. 12, 1898.

Despatch 'Ottawa, Sept. 11,' noticing the discovery of an Indian burial ground on an island in Lake Deschenes, Ottawa River. 17 skeletons were found (probably Algonquins), and a quantity of relics.

Toronto Daily Star.

Sept. 10, 1900.

'H. F. G.' notices the finding of the winter quarters of 1669-70 of Dollier de Casson and Galinee on Black Creek, near Port Dover. A letter from J. H. Coyne to C. C. James tells of this interesting find.

Traill, Mrs Catharine Parr

Pearls and Pebbles; or, Notes of an Old Naturalist, 241 pp. Toronto, 1894.

P. 62, the meaning of the Indian word Otonabee (River) 'flashing water running fast'; p. 67, Indian name of the Baltimore oriole, 'fire bird'; p. 78, scarlet tanager, 'war bird'; p. 79, grosbeak, 'cut throat'; p. 82, the Canada jay, 'Wis-ka-geen' or 'wis-ka-tjan,' (corrupted into 'whiskey-jack'; p. 129, 'wah-tap' (roots of the tamarac) and its preparation as thread for making birch-

Trail, Mrs. C. Parr—*Con*

bark canoes; pp. 179-186, under the chapter title, 'The Children of the Forest,' discusses the meanings of the Indian place names: Otonabee, Katchewanook, Ontario, Pem-a-dash-da-kota (Rice Lake), Napanee; also some personal names and sobriquets; Indian morality, laws and religion; p. 196, Indian use of the Broom rape plant as a cure for cancer; pp. 214-215. Indian rice (*Zizania aquatica*) and method of harvesting it; pp. 219-223, under the chapter title, 'Indian grass,' discusses the aromatic native grass (*Hierochloa*) woven by the Indian women into baskets, mats, braids, etc.; pp. 232-234, under the chapter title, 'The Indian Moss-bag,' describes the construction and use of the moss-bag for infants.

Warren, Hon W. W.

The Ojibway totem-system. Minnesota Hist. Soc. Coll., V. 1885, chapt. ii., pp. 41-53.

An excellent account by the learned Anglojibway.

Whittlesey, Charles

The Ancient Miners of Lake Superior. *Canadian Journal* (first series), vol. i., pp. 106 and 132.

A general discussion of the subject, with more special reference to the antiquities on Ontonogon River (with 7 illustrations).

Ancient Mining on the Shores of Lake Superior. Smithsonian Contributions to Knowledge. 155, Washington, April, 1863.

With outline map of the ancient mine pits of Point Keweenaw, Mich., and 21 other illustrations (wood-cuts), including some from Ontario.

Willmott, Arthur B., M.A., B.Sc.

Seventh Report of the Ontario Bureau of Mines, (2nd Part) (Toronto, 1898.)

P. 187, mentions old Indian pictures on a cliff at Dog Lake, from which the name Missanabi is derived.

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Wilson, Sir Daniel, LL.D

Caliban: the missing link. London, 1873. 271 pp.

P. 102, difficulty experienced by a missionary among the Chippeways in getting the doctrines of the Christian belief interpreted into pagan notions; pp. 104-5, explanation, by an Indian chief on Lake Superior, of the difference between the white man's God and his own Manitou.

Wintemberg, W. J

A remarkable Indian pipe, in The Reliquary and Illustrated Archæologist, April, 1900.

This article describes the Thunder Bird pipe found near the village of Bright in Oxford county. (See also Archæological Report for 1898, p. 46.)

Indian Village Sites in the counties of Oxford and Waterloo, pages 83-92 in the Archæological Report for 1899. (Toronto, 1900.)

Describes sites in the townships of Blenheim (7), North Dumfries (1), Waterloo (1), Wilmot (2), East Oxford (1).

Wolseley, Lord Garnet.

Narrative of the Red River Expedition of 1870.

First published anonymously in *Blackwood's* Magazine for December, 1870, and January and February, 1871, and subsequently with the author's name as No. II in the series of Travel, Adventure and Sport.

At p. 279, describes an old squaw near Wendigo Lake, addicted to cannibalism.

Yarrow, H. C

First Annual Report, Bureau of Ethnology, Washington, 1881.

Has references (at p. 198) to Algonquins lighting fires upon the graves of their dead.

Young, Rev. Egerton R.

Stories from Indian Wigwams and Northern Campfires. n d. London, Eng.

Describes the manners and customs of the Crees and Saulteaux of Keewatin, adjacent to Northwestern Ontario, observed during a missionary residence at Norway House.

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UNIVERSITY OF TORONTO.

AUDITOR'S REPORT

TO THE

BOARD OF TRUSTEES

ON

CAPITAL AND INCOME ACCOUNTS

FOR THE

YEAR ENDING 30TH JUNE, 1900.

ADOPTED 26TH SEPTEMBER, 1900.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON.
Printer to the Queen's Most Excellent Majesty.
1900.

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WARWICK BRO'S & RUTTER, PRINTERS.
TORONTO.

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AUDITOR'S REPORT

TO THE BOARD OF TRUSTEES ON CAPITAL AND INCOME ACCOUNTS FOR THE

YEAR ENDING 30TH JUNE, 1900

Adopted 26th September, 1900.

To the Trustees of the University of Toronto:

GENTLEMEN,—I beg to present the financial statements for the year ending 30th June, 1900. Each year the audit is delayed on account of the difficulty in obtaining from the Registrar the facts needed in order to adjust Fees account.

Undergraduates have dealings with two offices in order to transact their business with the University; were the offices connected, or even adjacent, the disadvantage would be less to the Undergraduates as well as to the University. No solution that has been proposed of this long standing difficulty is altogether satisfactory. An administrative building is out of the question. The appointment of a single officer to deal with Undergraduates in all their relations, other than academic, suggests itself as the most likely permanent solution.

Revenue account for the past year closes with a deficit of $13,948 95. In this as in previous years no portion of the advances made for street pavements has been charged to revenue. The liability of the University upon street pavements has now been fully discharged, namely :

Devonshire Place	$11,248 29
Hoskin Avenue	12,403 11
Adelaide Street	10 229 28
Total charge to Capital account	$33,880 68

W. H. CROSS,
Auditor.

TORONTO, September 17th, 1900.

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APPENDIX 1.

Balance Sheet 30 June 1900.

Funds.

General Endowments Fund,	Schedule	1	$3,497,751 65
Specific Endowment Funds	"	2	79,307 97
Retirement Fund	"	3	46,982 57
Trust Funds	"	4	24,416 97
Revenue Reservations	"	5	12,328 75
			$3.660,787 91

Assets.

Site lands, buildings and contents,	Schedule	6	$1,468,337 79
Unproductive lands	"	7	1,021,957 31
Leased property	"	8	461,824 52
Investments	"	9	707,689 83
Past due fees	"	10	978 46
			$3,660,787 91

SCHEDULE 1.

General Endowments Fund.

Received for strip of land six feet wide from St. George Street to the Campus		$ 900 00
Received for Avenue frontages:		
M. Wright in full	$150 00	
R. J. Score on account	100 00	
Dr. L. D. Palmer on account	10 00	
		260 00
Library Equipment:		
Value of additions to Library during 1899-1900 as shown by Accession catalogue	6,079 79	
Less-ratio of depreciation for year; three per cent upon $125,642.60	3,769 27	
		2,310 52
Increase for the year		3,470 52
Fund of 30 June 1899		3,494,281 13
Fund of 30 June 1900		$3,497,751 65

SCHEDULE 2.

Specific Endowment Funds.

Scholarships.

Blake, Matriculation	$21,653 89
Blake, Science and Moderns	3,750 00
Moss. Classics	2,000 00
Daniel Wilson, Natural Science	2,000 00
William Mulock, Classics and Mathematics	2,000 00
George Brown, Modern Languages	1,128 34
George Brown, Medical Science	5,391 72
Mary Mulock, Classics	2,778 74
William Ramsay, Political Economy	1,009 42
Julius Rossin, German	1,000 00
Bankers, Political Science	1,200 00

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John Macdonald, Philosophy	2,030 00	
Physics	2,350 00	
Prince of Wales Prize, General Proficiency	950 00	
Mackenzie Memorial	17,584 60	
Fulton Bequest	3,291 30	
Starr Bequest	4,535 23	
Stewart Bequest	1,312 86	
Lyle Medal	165 17	
Young Memorial	3,076 70	
Gibson, Matriculation	100 00	
		$79,307 97
Return of 30 June 1899	78,771 08	
Interest appropriation	4,174 39	
Rent, Starr Farm	120 00	
Gibson, Matriculation	100 00	
	$83,165 47	
Scholarship expenditures	3,857 50	
		$79,307 97

SCHEDULE 3.

Retirement Fund.

Beneficiaries, 30th June 1900.

James Loudon	$5,692 12	
Alfred Baker	3,218 66	
Maurice Hutton	3,218 66	
R. Ramsay Wright	3,218 66	
W. J. Alexander	3 218 66	
J. G. Hume	2,986 14	
J. F. McCurdy	2,413 13	
James Mavor	2,193 80	
G. M. Wrong	1,666 04	
J. E. Berkeley Smith	1,643 62	
A. B. McCallum	1,530 06	
W. H. Fraser	1,530 06	
John Squair	1,530 06	
W. J. Loudon	1,208 16	
D. R. Keys	1,208 16	
John Fletcher	1,117 89	
H. H. Langton	1,026 54	
W. S. Milner	776 18	
J. H. Cameron	776 18	
G. H. Needler	776 18	
W. Lash Miller	775 97	
August Kirschmann	728 91	
James Brebner	658 24	
A. T. DeLury	646 66	
C. A. Chant	646 66	
E. C. Jeffrey	646 66	
Adam Carruthers	625 57	
J. C. McLennan	421 40	
R. G. Murison	248 30	
G. W. Johnston	248 30	
R. R. Bensley	214 51	
P. Toews	172 43	
		$46,982 57

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Fund of 30th June, 1899		$40,645 80	
Payments upon retirement		1,278 48	
		$39,367 32	
Interest as per terms of Order in Council		2,494 63	
Contributions 1899-1900		5,120 62	
Fund of 30th June, 1900			$46,982 57

SCHEDULE 4.

Trust Accounts.

Residence-Extension Fund		$ 905 28	
Hon. William Mulock		607 78	
Library Funds—			
Insurance	$20,663 20		
German	1 60		
French	5 00		
Greek	30 00		
		20,699 80	
Medical Faculty Funds—			
Sanitary Science	$ 28 46		
Gynæcological	50 00		
Materia Medica	57 56		
		136 02	
Museum donations		1,162 93	
Biological Students Supply		722 91	
Langton Memorial		30 00	
Local Lectures Fund		152 25	
			$24,416 97
Return of 30th June, 1899		$26 777 67	
Interest appropriations		744 21	
Receipts during 1899-1900		1,213 55	
		$28,735 43	
Library expenditures	$ 3,500 34		
Other expenditures	818 12		
		4,318 46	
			$24,416 97

SCHEDULE 5a.

Revenue Reservations.

Accrued income 30th June, 1896		$29,179 41
Contingent Fund—		
Amount 30th June, 1899	$15,816 58	
Loss on loan of $1,500, upon farm in Seymour, made to Daniel Connolly in 1886	350 00	
		15,466 58
		$44,645 99

Suspense Account.

Unpaid portion of some $2,500, expended upon granolithic walks in the grounds	$ 750 00
	$43,895 99

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REVENUE ACCOUNT.

Deficit on 30th June, 1899	$16,884 20	
Deficit 1899-1900, ordinary account	13,948 95	
University College Residence—		
Deficit 30th June, 1899	674 09	
Steward's wages	60 00	
		$31 567 24
		$12.328 75

SCHEDULE 5b.

INCOME ACCRUED BUT NOT DUE.

Accounts.	30th June. 1900.	30th June, 1899.
Debentures	$ 4,982 10	$ 5,633 21
Mortgages	6,359 40	6,933 99
Park rentals	4.663 75	4,515 25
School of Science	154 58	154 58
Business rentals	778 84	778 84
City of Toronto	1,500 00	1,500 00
Interest from land sales	58 18	156 04
	$18.496 85	$19,671 91
Agricultural fees	421 46	327 12
Other fees	57 00	94 00
	$18,975 31	$20,093 03

SCHEDULE 5c.

REVENUE 1899-1900.

Outlay.

Appropriations as per page 6 of printed report of your Finance Commitee:		
Out of ordinary revenue	$127,044 25	
As interest upon special funds	7,357 34	
Supplementary appropriations	2,197 64	
	$136,599 23	

Less.

Unused of original appropriations	878 36	
		$135,720 87

Income.

Account.	Estimate.	Actual.
Interest:		
On purchase moneys	$ 508 21	$ 482 29
On loans	20,740 37	21,038 61
On debentures	11,618 41	11,409 12
On advances to U. C. College	7,670 81	7,670 81
Advances to Medical Faculty	34 75	34 75
On bank balances	350 00	251 13

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Rents :

University Park	$11,232 50	$11,060 08	
Business properties	3,475 00	3,477 04	
School of Science	925 00	925 00	
Medical Faculty	1,900 00	1,900 00	
Board of Health	200 00	200 00	
City of Toronto payment	6,000 00	6,000 00	
Legislative grant	7,000 00	7,000 00	
Crown Lands sold	3,600 00	3,619 46	
Mortgage transfer fees	25 00	20 62	
Sundry earnings, land	2 000 00	1,980 77	
Gymnasium fees	900 00	911 90	
University and College fees	42,000 00	43,790 34	
	$120,180 05		$121,771 92
Deficit 1899-1900 ordinary account..			$13,948 92

SCHEDULE 5*d*.

Revenue Expenditures 1899-1900.

Service.	Original Appropriation.	Supplementary Appropriation.	Unused.
Salaries	$95,107 50	$1,083 35	
Pensions	2,800 00		
Examiners	2,900 00	157 66	
Convocation expenses	50 00	205 50	
President's office	250 00	14 50	
Bursar's office	750 00		8 09
Registrar's office	50 00		
Stationery, University	800 00		55 52
" University College	75 00		
Printing University	2,400 00	205 84	
" University College	75 00		
Advertising, University	200 00		17 37
" University College	125 00		22 95
Incidentals, University	100 00	12 50	
" University College	50 00		20 13
" General	450 00		91 23
Law costs	450 00		23 38
Interest on trust funds	7,357 34	55 89	
Insurance	1,800 00		176 88
Telephones	135 00		
Grounds	3 000 00		
Main building	3,125 00	274 48	
Library building	825 00		66 26
Biological building	1.540 00		17 63
Chemical building	1,045 00	2 73	
Gymnasium building	1,250 00		140 64
Library proper	2,600 00		
Biological students Supplies	646 75		
Biological department	850 00		147 03
Chemical "	400 00	120 22	
Mineralogical "	200 00	15 13	
Physiological "	475 00		
Physical "	1,800 00	49 84	

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Philosophical department	$300 00	....	....
Mathematical "	40 00	....	$40 00
Political Science "	150 00	....	....
Classical "	30 00	....	22 50
English "	100 00	....	....
French "	10 00	....	....
German "	30 00	....	....
Italian and Spanish "	20 00	....	8 75
Oriental "	20 00	....	....
History "	20 00	....	20 00
Original appropriations	$134,401 59		
Supplementary appropriations		$2,197 64	
Unused appropriations			$878 36

SCHEDULE 6.

Site Lands, Buildings and Contents.

30th June, 1900.

Lands set apart for the use of the University		$475,361 40	
Main building and residence		450,000 00	
Museum building		73,085 42	
Biological building		56,659 88	
Library building		110,015 65	
Chemical building		77,469 88	
Gymnasium building		36,288 46	
Y. M. C. A. Hall		1 00	
South Lodge		1,000 00	
			$1,279,881 69
Library proper		121,873 33	
Museum proper, fittings and biological apparatus		24,691 02	
Chemical apparatus		9,975 90	
Mineralogical and Geological apparatus		8,212 16	
Physical apparatus		15,900 00	
Psychological apparatus		1,800 00	
Mathematical apparatus		600 00	
			$183,052 41
Main building furniture		3,841 20	
Residence furniture		1,562 49	
			$5,403 69
			$1,468,337 79
Return of 30 June, 1899		$1,466,261 18	
Additions to Library during year		6,079 79	
		$1,472,340 97	
Yearly allowance for depreciation of Library		$3,769 27	
Proceeds of sale of portion of residence chattels	233 91		
		$4,003 18	
			$1,468 337 79

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SCHEDULE 7.

Unproductive Lands.

Hoskin Ave. and Devonshire Place survey		$164 336 70	
Block between North Drive and Devonshire Place surveys		217,657 53	
Block east of North Drive, unsurveyed		86 751 00	
Lots numbered 51, 52, 54, 69, 70 and 71		91,273 50	
Lots on College Avenue Nos. 3, 6, 8 and 9		36,864 00	
Lots in Port Hope		7,100 00	
Lots near Belleville		1,790 00	
Indian Road property		7,421 60	
Farm Lands		152 00	
College block, King Street, Toronto		407,893 89	
Crawford Street vacant lot		717 09	
			$1,021,957 31
Return of 30th June, 1899		$1,004,569 88	
Hoskin Avenue Asphalt pavement, final payment		12,067 96	
Adelaide Street Asphalt pavement, last instalment but one		1,278 66	
Interest upon advances upon U.C. College Block on King St.		7,670 81	
		$1,025,587 31	
Portion of Park lots Nos. 55 and 56 leased to Dr. McPhedran	$3,600.		
Land sale near Belleville	30.		
		3,630 00	
			$1,021,957 31

SCHEDULE 8.

Leased Lands.

Victoria College site	$ 1 00	
Wycliffe College site	2,500 00	
Observatory site	1 00	
School of Science site	18,500 00	
Land leased to City of Toronto	120,000 00	
Park lands	192,205 00	
Toronto business properties	69,600 00	
Caradoc farm	2,000 00	
Valuation of lands		$404,807 00
St. George Street house and land	8,031 85	
Cumberland dwelling house	14,842 75	
Park Hospital building	24,982 16	
		47,856 76
Wycliffe College pavement		1,256 34
Park ground rents:—		
Past due	$ 807 25	
Accrued but not due	4,663 75	
City of Toronto payment	1,500 00	
School of Science accrued	154 58	
Other ground rents, accrued but not due	778 84	
		7,904 42
		$461,824 52

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Return of 30 June, 1899	$454,931 07	
Lease of lot 60x200 S.S. Bloor Street at $180 per annum	3,600 00	
Expended upon St. George Street house	1,031 85	
Expended upon Cumberland house	1,768 01	
Expended upon residence portion of old Wycliffe College building	182 65	
Increase in outstandings	338 50	
	$461,852 08	
Principal portion of $75, repayment by Wycliffe College for pavement	27 56	
		$461,824 52

SCHEDULE 9.

Investments.

30th June, 1900.

Debentures and Municipal bonds	$265,667 19	
Interest past due	973 69	
Interest, accrued but not due	4,982 10	
		$271,622 98
Loans secured by mortgages upon real property	$386,014 46	
Advanced as premium on fire policies	119 89	
Interest past due	2,772 32	
Interest, accrued but not due	6,359 40	
		395,266 07
Unpaid purchase money on land sales	$17,227 74	
Interest past due	55 00	
Interest, accrued but not due	58 18	
Earnings past due	45 00	
		17,385 92
Canadian Bank of Commerce, on deposit		23,414 86
		$707,689 83

1899-1900 Transactions.

Inwards.

Debentures paid off	$43,936 17	
Loans repaid	39,891 30	
Medical Faculty repayment	695 00	
Instalment upon land sales	6,312 90	
Decreased revenue outstanding	225 40	
Withdrawals from Canadian Bank of Commerce	199,986 63	
		$291,047 40

Outwards.

Debentures purchased	$31,983 42	
Mortgage re-investment	19,231 65	
Purchase moneys:		
Six feet of land on St. George Street	900 00	
Belleville land sale	30 00	
Deposited in the Canadian Bank of Commerce	208,251 06	
		260,396 13
Decrease during the year in volume		$30,651 27
Return of 30th June, 1899		738,341 10
Return of 30th June, 1900		$707,689 83

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SCHEDULE 10.

Fees.

Actual receipts during 1899-1900		$44,233 00
Deduct		
Arrears of 1899 collected and included therein	$ 357 12	
Burglary repayment	500 00	
		857 12
		$ 43,375 88
Add		
Arrears of 1899-1900 fees		414 46
Fees of 1899-1900 are thus		$43,790 34

1898-9 Arrears.

Collections during 1899-1900 :—		
Agricultural fees	$ 327 12	
Other fees	30 00	
Burglary loss	500 00	
		$ 857 12
Written off :—		
Portion of registration fee	$ 18 00	
One registration fee	36 00	
One dispensation fee	10 00	
		64 00
Unpaid of burglary loss		500 00
Arrears of 30th June, 1899		$ 1,421 12

1899-1900 Arrears.

Agricultural arrears, 30 June, 1899	$ 327 12	
Eighteen degrees	180 00	
Examination outlays, 1899-1900	339 34	
	$ 846 46	
Received from department of Agriculture	425 00	
		$ 421 46
Portion of one registration fee	$ 13 00	
Three library fees	6 00	
Three Psychological Laboratory fees	7 00	
One Biological Laboratory fee	20 00	
One penalty	1 00	
One matriculation fee	10 00	
		57 00
Burglary loss remaining to be paid		500 00
Arrears of 30th June, 1900		$978 46

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APPENDIX 2.

Fees Received 1899-1900.

Faculty of Arts.

Subject.	1st Year.	2nd Year.	3rd Year.	4th Year.	Miscellaneous
	$ c.	$ c.	$ c.	$ c.	$ c.
College fees	4,896 00	3,860 00	3,338 00	3,545 00	140 00
Penalties	36 00	17 00	18 00	29 00	8 00
Dispensations	60 00	90 00	25 00	95 00	43 00
Honor Certificates	....	1 00	....	....	54 00
Matriculation	17 00	....	....	....	382 00
Ad Eundem	....	20 00	10 00	20 00	....
Examination	2,812 00	2,606 00	2.053 00	2,366 00	1,092 00
Degrees	....	....	....	1,350 00	240 00
Chemical supply	30 00	67 00	46 00	47 00	....
Mineralogical supply	....	8 00	8 00	34 00	....
Biological "	52 00	15 00	82 00	175 00	....
Physical "	80 00	81 00	176 00	67 00	....
Psychological "	....	....	28 00	52 00	....
Library	400 00	306 00	252 00	276 00	8 00
Medical Students:					
Matriculation	61 00	15 00	4 00	10 00	....
Ad Eundum	28 00	10 00	....	....	....
Honor Certificate	....	....	....	....	....
Examination	955 00	620 00	240 00	520 00	110 00
Degrees	....	....	....	880 00	100 00
Chemical supply	279 00	162 00	....	....	....
Biological "	139 50	148 50	....	....	....
Instruction to Medical Faculty in Arts Subjects	1,344 00	810 00	....	....	....
Instruction to Practical Science Students	1,102 00	522 00	66 00	....	....
Totals	12,291 50	9.358 50	6,346 00	9,466 00	2,177 00

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APPENDIX 2—*Continued.*

Departmental Fees

Subject.	Law.	Dentistry.	Engineering and Applied Science.	Music.	Pharmacy.
	$ c.	$ c.	$ c.	$ c.	$ c.
Matriculation	80 00	150 00	....	10 00	160 00
Examination	100 00	931 00	100 00	30 00	340 00
Practical Examination	....	....	....	....	68 00
Degrees	40 00	1,110 00	160 00	60 00	330 00
	220 00	2,191 00	260 00	100 00	898 00

Classification of Fees Paid.

First year	$12 291 50
Second year	9,358 50
Third year	6 346 00
Fourth year	9,466 00
Miscellaneous	2,177 00
Law	220 00
Dentistry	2,191 00
Engineering	260 00
Music	100 00
Pharmacy	898 00
Agricultural	425 00
	$43,733 00

Classification of Services.

College fees	$15,779 00
Penalties	108 00
Dispensations	313 00
Honor Certificates	55 00
Matriculation	889 00
Ad Eundem	88 00
Examination	14,875 00
Practical Examination	68 00
Degrees	4,270 00
Chemical supply	631 00
Mineralogical supply	50 00
Biological "	612 00
Physical "	404 00
Psychological "	80 00
Library	1,242 00
Instruction to Medical Faculty, Arts Subjects	2,154 00
Instruction to Practical Science Students	1,690 00
Agriculture, payment by Government	425 00
	$43,733 00

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APPENDIX 3.

Medical Faculty Fees.

First year	$9,980 00	
Less Arts portion	1,344 00	
		$ 8,636 00
Second year	5,870 00	
Less Arts portion	810 00	
		5,060 00
Third year		4,685 00
Fourth year		4,780 00
Miscellaneous fees		360 00
Registration fees		515 00
Psychological fees (collected for Dr. Daniel Clark)		245 00
Interest on bank account		183 73
Collections during 1899-1900		$24,464 73

Contra.

Salaries:		
Professors and Associate Professors	$11,125 28	
Lecturers and Instructors	1,745 72	
Demonstrators and Asst. Demonstrators	1,525 00	
		$14,396 00
Honorarium to Dr. Richardson		250 00
Psychological fees paid over to Dr. Clark		245 00
Wages of attendants		1,230 00
Rentals:		
Biological building	$1,900 00	
Gerrard street building	1,000 00	
		2,900 00
Interest on University advance for repairs, 5% on $695	$ 34 75	
Re-payment of balance of advance	695 00	
		729 75
Working expenses		4,713 98
		$24,464 73
Arrears on 30th June, 1899 (all collected and included in above)		$225 00
Third year fees 1899-1900 unpaid	315 00	
Arrears 30th June, 1900		$315 00

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UNIVERSITY OF TORONTO.

REPORT

OF

STANDING COMMITTEE ON FINANCE

1900–1901.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON
Printer to the King's Most Excellent Majesty.
1901.

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UNIVERSITY OF TORONTO

REPORT

OF THE

STANDING COMMITTEE ON FINANCE.

TORONTO, March, 1901.

The Standing Committee on Finance beg to submit their report for the year ending 30th June, 1901.

1. They have obtained from the Bursar the estimates of the receipts on income account for the year; and from the Bursar and the heads of University departments they have received estimates of probable expenditures for the year.

2. They also incorporate in their report, for the sake of convenience, the estimates of University College, which have been furnished to the Committee for their information by the Council of University College.

3. The forms of account which were employed in last year's report have been adhered to, and for the purpose of comparison the actual results of the transactions of the year 1899-1900 are given.

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ESTIMATE OF REVENUE, YEAR 1900-1901.

Account.		Estimate 1900-1901.	Actual receipts 1899-1900
Interest on purchase moneys		407 15	482 29
" loans		19,702 14	21,088 61
" debentures		10,501 38	11,409 12
" bank balances		800 00	251 13
" advances to U. C. College		8,077 85	7,670 81
Rents, University Park		11,050 50	11,060 08
" business properties		3,475 00	3,477 04
" School of Science		925 00	925 00
" Medical Faculty (part Biol. bldg.)		1,900 00	1,900 00
" Prov. Board of Health (part Biol. bldg.)		200 00	200 00
City of Toronto payment		6,000 00	6,000 00
Legislative grant		7,000 00	7,000 00
Wild lands sales		2,500 00	3,619 46
Sundry earnings of lands		2,450 00	1,980 77
University and College fees		45,000 00	43,790 34
Gymnasium fees		1,000 00	911 90
		$120,489 02	$121,716 55
Deductions.			
Interest on the following special funds.			
(6 per cent.) Retirement Fund	$2,861 23		
(3 per cent.) Library Insurance Fund	619 88		
(3 per cent.) Residence Extension Fund	27 16		
(3 per cent.) Wm. Mulock, Esq	18 22		
Specific Endowments (scholarships, etc.)	4,002 36		
		7,528 85	
Net available revenue		$112,960 17	

REMARKS.

1. The deficit estimated for 1899-1900, as shown by the last report of the Finance Committee, was $14,221.54, and the actual deficit was $13,948.92.

2. The Committee have examined with minute care the various items in the estimate for 1900-1901, and believe that no further economies are possible.

3. The Committee regret that the deficit for the current year is estimated at $27,627.36, without taking into consideration the unpaid interest on advances *re* Upper Canada College Block.

J. LOUDON,
Chairman.

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SUMMARY OF ESTIMATED EXPENDITURE, YEAR 1900-1901.

——	Payable out of interest on special funds.	Payable out of ordinary revenue.	Expenditure 1899-1900.
	$ c.	$ c.	$ c.
1. Salaries and Pensions:			
(a) Salaries	....	100,717 00	96,190 85
(b) Pensions	....	2,800 00	2,800 00
2. Bursar's Office	....	750 00	741 91
3. Expenses re investments, etc	....	1,100 00	785 39
4. Scholarship and Fellowships	4,057 50	....	3,857 50
5. Examiners	....	3,195 00	3,057 66
6. Insurance	....	1,800 00	1,623 12
7. Telephones	....	200 00	135 00
8. Library:			
Grant from Library Insurance Fund (Capital)	3,400 00	....	} 6,020 34
Customary grant	....	2,600 00	
Maintenance	....	875 00	758 74
9. Main Building:			
(a) Repairs, maintenance of structure, fuel, water, gas, etc	....	5,475 00	3,399 48
(b) President's Office	....	325 00	264 50
(c) Registrar's Office	....	50 00	50 00
10. Grounds	....	3,350 00	3,000 00
11. Chemical Department:			
(a) Maintenance of structure	....	1,632 00	1,047 73
(b) Maintenance of department	....	1,000 00	520 22
12. Biological Department:			
Maintenance of structure, fuel, water, gas, etc	....	2,756 53	1,522 37
Maintenance of department	....	2,512 00	1,349 72
13. Physiological Department			
Maintenance and apparatus	....	1,200 00	475 00
14. Physical Department:			
Maintenance and apparatus	....	1,800 00	1,849 84
15. Mineralogical and Geological Department:			
Maintenance	....	200 00	215 13
16. Psychological Department—Maintenance	....	500 00	300 00
17. Mathematical Department		....	....
18. Political Science Department—Class Room supplies,	....	25 00	25 00
Books	....	....	125 00
19. History—Class Room supplies	....	20 00	....
20. Classics "	....	30 00	7 50
21. English "	....	100 00	100 00
22. French "	....	20 00	10 00
23. German "	....	40 00	30 00
24. Italian and Spanish—Class Room supplies	....	15 00	11 25
25. Oriental Literature	....	25 00	20 00
26. Stationery—University	....	900 00	744 48
27. Printing "	....	2,600 00	2,605 84
28. Advertising "	....	200 00	182 63
29. Incidentals "	....	175 00	112 50
30. Stationery—University College	....	75 00	75 00
31. Printing "	....	75 00	75 00
32. Advertising "	....	100 00	102 05
33. Incidentals "	....	50 00	29 87
34. Convocation expenses	....	250 00	255 50
35. Senate elections	....	....	....
36. Gymnasium—Maintenance	....	1,050 00	1,109 36
	7,457 50	140,587 53	135,585 48
Total estimated expenditure out of ordinary income	....	....	140,587 53
Total available income (p. 5)	....	....	112,960 17
Deficit	....	....	27,627 36

Detailed Estimate of Expenditure, Year 1900-1901.

Salaries.	Estimated amount, year ending 30th June, 1901.	Amount paid year ending 30th June, 1900.
	$ c.	$ c.
1. Bursar's Office :		
Bursar	1,600 00	1,600 00
Accountant	1,200 00	1,000 00
Fee Clerk (4 months at $50)	200 00	
	3,000 00	2,600 00
2. Library :		
Librarian	2,000 00	1,950 00
First Assistant	500 00	500 00
Second Assistant	437 50	387 50
Third Assistant	437 50	420 00
Delivery Clerk	100 00	80 00
Caretaker	450 00	450 00
	3,925 00	3,787 50
3. General as between University and University College :		
President (also paid as Professor of Physics)	1,800 00	1,800 00
Janitor	468 00	525 00
Gardener	480 00	480 00
Engineer (with rooms and fuel)	576 00	576 00
Firemar (salary at $35 per month for eight months)	280 00	280 00
Carpenter	540 00	540 00
Cleaners	440 00	360 00
	4,584 00	4,561 00
4. Pensions :		
E. J. Chapman	1,800 00	1,800 00
J. M. Hirschfelder	1,000 00	1,000 00
	2,800 00	2,800 00
. University of Toronto, general :		
Vice-Chancellor	523 00	....
Registrar	1,500 00	1,500 00
Registrar's Assistant (also paid as Lecturer in Greek)	100 00	200 00
Registrar's Stenographer	250 00	....
Bedel (with free house)	600 00	800 00
Architect	100 00	100 00
	3,073 00	2,600 00
. Teaching staff, etc., University of Toronto :		
(a) Modern History and Ethnology :		
Professor (salary at $3,000 for three months, $750; at $3,100 for nine months, $2,325)	3,075 00	2,975 00
	3,075 00	2,975 00
(b) Political Science :		
Professor	3,200 00	3,175 00
Professor of Constitutional and International Law	750 00	700 00
Professor of Roman Law, Jurisprudence and History of English Law	750 00	600 00
Lecturer	1,000 00	600 00
	5,700 00	5,075 00

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DETAILED ESTIMATE OF EXPENDITURE, YEAR 1900-1901.—*Continued.*

Salaries.	Estimated amount year ending 30th June, 1901.	Amount paid year ending 30th June, 1900.
Teaching staff, etc., University of Toronto.—*Continued.*	$ c.	$ c.
(c) Mathematics:		
Professor	3,200 00	3,200 00
Lecturer (salary at $1,700 for three months, $425; at $1,800 for nine months, $1,350)	1,775 00	1,675 00
Fellow	500 00	500 00
	5,475 00	5,375 00
(d) Physics:		
Professor	3,200 00	3,200 00
Demonstrator	1,800 00	1,800 00
Lecturer (salary at $1,700 for three months, $425; at $1,800 for nine months, $1,350)	1,775 00	1,675 00
Demonstrator	1,200 00	1,100 00
Mechanical Assistant	1,000 00	1,000 00
Lecture Assistant	650 00	400 00
	9,625 00	9,175 00
(e) Chemistry:		
Professor	2,500 00	775 00
Assoc. Professor (Demonstrator 1899-1900)	1,800 00	1,775 00
Demonstrator (additional for session)		600 00
Lecturer	750 00	306 90
Lecturer (assistant for 1899-1900)	750 00	500 00
" " " (additional for session)		300 00
Fellow	500 00	500 00
Assistant	400 00	500 00
" (additional for session)		430 00
Attendant	504 00	504 00
Cleaner	135 00	120 00
	7,339 00	6,810 90
(f) Mineralogy and Geology:		
Professor (Acting)	500 00	500 00
Instructor	850 00	700 00
Class Assistant	50 00	....
Attendant	200 00	200 00
	1,600 00	1,400 00
(g) Biology:		
Professor	3,200 00	3,200 00
Lecturer (salary at $1,700 for three months, $425; at $1,800 for nine months, $1,350)	1,775 00	1,675 00
Demonstrator	1,200 00	1,100 00
Fellow	500 00	500 00
Temporary Assistant in Botany	....	150 00
" " Zoology	....	275 00
" " "	....	125 00
" " Laboratory, four at $50	200 00	....
Sub-Curator of Museum	750 00	750 00
Attendant and Caretaker	500 00	500 00
Boy attendant	120 00	180 00
Special services during session	....	100 00
	8,245 00	8,555 00
(h) Physiology:		
Associate Professor	2,500 00	2,475 00
	2,500 00	2,475 00
(i) Italian and Spanish:		
Associate Professor	2,500 00	2,475 00
Instructor in Italian	400 00	400 00
Instructor in Spanish	50 00	50 00
	2,950 00	2,925 00

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Detailed Estimate of Expenditure. Year 1900-1901

Salaries.	Estimated amount year ending 30th June, 1901.	Amount paid year ending 30th June, 1900.
6. Teaching staff, etc., University of Toronto.—*Continued.*		
(*k*) Logic and Metaphysics:		
Associate Professor of Philosophy, etc	1,800 00	1,800 00
Lecturer in Philosophy (salary at $1,300 for three months, $325; at $1,400 for nine months, $1,050)	1,375 00	1,275 00
Instructor and Laboratory Assistant	700 00	600 00
	3,875 00	3,675 00
7. Teaching staff, University College:		
(*a*) Ethics:		
Professor	3,200 00	3,200 00
	3,200 00	3,200 00
(*b*) Greek:		
Professor	3,200 00	3,200 00
Lecturer	1,700 00	1,575 00
	4,900 00	4,775 00
(*c*) Latin:		
Professor (salary at $2,900 for three months, $725; at $3,000 for nine months. $2,250)	2,975 00	2,875 00
Lecturer	1,800 00	1,775 00
Lecturer (salary at $1.300 for three months, $325; at $1,400 for nine months, $1,050)	1,375 00	1,275 00
	6,150 00	5,925 00
d) Oriental Literature:		
Professor	3,200 00	3,175 00
Lecturer (salary at $1,300 for three months, $350; at $1,400 for nine months, $1,050)	1.375 00	1,275 00
	4,575 00	4,450 00
(*e*) Englis		
Professor	3,200 00	3,200 00
Lecturer	1,800 00	1,800 00
	5,000 00	5,000 00
(*f*) French:		
Associate Professor	2,500 00	2,475 00
Lecturer	1,800 00	1,775 00
Instructor	750 00	600 00
	5,050 00	4,850 00
(*g*) German:		
Assistant Professor	2,500 00	2,500 00
Lecturer	1,800 00	1,775 00
Instructor	1,000 00	975 00
	5,300 00	5,250 00
8. Gymnasium:		
Secretary	200 00	150 00
Instructor	800 00	800 00
Caretaker	576 00	500 00
	1,576 00	1,450 00

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DETAILED ESTIMATE OF EXPENDITURE, YEAR 1900-1901.—*Continued.*

Expenses.	Payable out of interest on special funds.	Paid out of ordinary revenue.	Amount paid 1899-1900.
	$ c.	$ c.	$ c.
2. Bursar's office:			
Stationery, printing, postage and incidentals	....	450 00	441 91
Auditor	....	300 00	300 00
	....	750 00	741 91
3. Expenses *re* investments, etc:			
(*a*) Law costs, including Ellsworth claim	....	700 00	476 62
(*b*) General incidentals (including commission on loans).	....	400 00	358 77
	....	1,100 00	785 39
4. Scholarships and Fellowships:			
(*a*) Scholarships:			
Junior Matriculation:			
1. Prince of Wales	50 00	....	50 00
Edward Blake Scholarship			
1*a*. General Proficiency	60 00	....	60 00
2. "	42 50	....	42 50
3. "	25 00	....	25 00
4. "	22 50	....	22 50
5. "	20 00	....	20 00
6. "	17 50	....	17 50
7. "	15 00	....	15 00
8. " West Durham........	25 00	....	25 00
1. Classics and Mathematics	60 00	....	60 00
2. "	20 00	....	....
1. Classics and Moderns	60 00	....	60 00
2. "	42 50	....	42 50
3. "	20 00	....	20 00
4. "	17 50	....	17 50
1. Mathematics and Moderns	60 00	....	60 00
2. "	20 00	....	20 00
1. Mathematics and Science	60 00	....	60 00
2. "	20 00	....	20 00
1. Moderns and Science	60 00	....	....
2. "	20 00	....	20 00
1. Mathematics	60 00	....	60 00
2. "	15 00	....	10 00
1. Moderns	60 00	....	60 00
2. "	15 00	....	15 00
1. Science	60 00	....	60 00
2. "	15 00	....	15 00
1. Classics—Mary Mulock	60 00	....	60 00
2. " "	60 00	....	120 00
First Year:			
Classics (Moss Scholarship)..........	60 00	....	60 00
Modern Languages (Blake Scholarship)	60 00	....	60 00
Mathematics and Physics (Fulton Scholarship).	60 00	....	60 00
Natural Science (Fulton Scholarship)	60 00	....	60 00
Chemistry and Mineralogy } Fulton Scholarship	30 00	....	30 00
Chemistry and Physics.... } Fulton Scholarship	30 00	....	30 00
Political Science (Banker's Scholarship)........	70 00	....	70 00
Second Year:			
Classics (William Mulock Scholarship)..........	60 00	....	60 00
Modern Languages (George Brown Scholarship)	60 00	....	120 00
Political Science (Alexander Mackenzie Scholarship) No. 1	75 00	....	75 00
Political Science (Alexander Mackenzie Scholarship) No. 2	50 00	....	50 00
Philosophy (John Macdonald Scholarship)	50 00	....	50 00

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DETAILED ESTIMATE OF EXPENDITURE, YEAR 1900 1901—*Continued.*

Expenses.	Payable out of interest on special funds.	Paid out of ordinary revenue.	Amount paid 1899-1900.
Scholarships.—*Continued.*	$ c.	$ c.	$ c.
Second Year:			
Mathematics and Physics (William Mulock Scholarship)	60 00		60 00
Natural Science (Blake Scholarship)	60 00		60 00
Chemistry and Mineralogy (Blake Scholarship).	60 00		60 00
Chemistry and Physics (Blake Scholarship)	60 00		
Third Year:			
Classics	60 00		60 00
Modern Languages (Julius Rossin Scholarship).	60 00		60 00
Ethics (John Macdonald Scholarship)	50 00		50 00
Political Science (Alexander Mackenzie Scholarship) No. 1	75 00		75 00
Political Science (Alexander Mackenzie Scholarship) No. 2	50 00		50 00
Mathematics and Physics (A. A. A. S. Scholarship)	75 00		75 00
Natural Science (Daniel Wilson Scholarship):			
Div. I	30 00		30 00
Div. II	30 00		30 00
Chemistry and Mineralogy (Daniel Wilson Scholarship)	60 00		60 00
Chemistry and Physics (A. A. A. S. Scholarship).	70 00		70 00
Post Graduate:			
Political Science (Ramsay Scholarship)	60 00		60 00
Philosophy (George Paxton Young Memorial Scholarship)	400 00		325 00
Medicine (Brown Memorial Scholarship)	300 00		300 00
(*b*) Graduate Fellowship:			
Alexander Mackenzie Graduate Fellowship in Political Science	375 00		375 00
Alexander Mackenzie Graduate Fellowship in Political Science	375 00		375 00
5. Examiners:			
Arts		600 00	591 43
Medicine		1,000 00	912 25
Law		80 00	40 00
Engineering and Applied Science		200 00	200 00
Dentistry		450 00	485 75
Agriculture		250 00	339 34
Music		40 00	40 00
Pharmacy		400 00	373 89
Pedagogy		100 00	
Matriculation		75 00	75 00
		3,195 00	3,057 66
6. Insurance:			
For three years $5,400.00. Proportion charged to revenue of 1900-1901		1,800 00	1,623 12
		1,800 00	1,623 12
7. Telephones		200 00	135 00

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DETAILED ESTIMATE OF EXPENDITURE, YEAR 1900-1901 —*Continued.*

Expenses.	Payable out of interest on special funds.	Payable out of ordinary revenue.	Amount paid 1899-1900.
	$ c.	$ c.	$ c.
8. Library (exclusive of salaries):			
From Library Insurance Fund Capital	3,400 00		6,020 34
Customary grant		2,600 00	
Maintenance: Fuel		350 00	399 54
Water		25 00	38 51
Cleaning		175 00	161 65
Repairs and incidentals		325 00	159 04
	3,400 00	3,475 00	6,779 08
9. Main building, including servants' houses:			
(a) Maintenance, permanent improvements		1,750 00	
Repairs (carpentry, plumbing and sundries)		1,200 00	1,937 42
Fuel		2,100 00	1,116 81
Water		225 00	180 00
Gas and Electric Light		200 00	165 26
(b) President's office		325 00	264 50
(c) Registrar's office		50 00	50 00
		5,850 00	3,713 98
10. Grounds:			
(a) Labor, tools, flag pole, etc		2,850 00	3,000 00
(b) Part of cost of roads, sidewalks, etc		500 00	
		3,350 00	3,000 00
11. Chemical Department:			
(a) Maintenance—Fuel		525 00	503 10
Gas and electric light		140 00	135 66
Water		120 00	104 04
Cleaning		75 00	304 93
Repairs and incidentals		550 00	
Fitting up physical chem. lab'y		222 00	
		1,632 00	1,047 73
(b) Maintenance of Department—Chemicals, etc		1,000 00	520 22
		1,000 00	520 22
12. Biological Buildings: Maintenance of structure—			
Fuel		900 00	798 14
Gas and electric light		250 00	187 46
Water		150 00	119 77
House furnishings and cleaning materials		170 00	70 99
Repairs, including carpentry and plumbing		325 00	113 51
Additional attendance and cleaning assistance (exclusive of mineralogical and anatomical rooms)		230 00	232 50
Extraordinary expenditure—			
1. Ventilating fan		416 21	
2. Fitting up new Physiological Laboratory		215 32	
3. Electric wiring (west wing)		100 00	
		2,756 53	1,522 37
Biological Department:			
Laboratory and lecture room supplies		300 00	702 97
Museum supplies		350 00	
Marine laboratory		200 00	
Museum cases		500 00	
Students' laboratory supplies		612 00	646 75
Assistance in preparing catalogue		250 00	
Scientific reception		300 00	
		2,512 00	1,349 72
13. Physiological Department:			
Maintenance—Apparatus, etc		1,200 00	475 00
		1,200 00	475 00
*14. Physical Department:			
Maintenance—Supplies and apparatus		1,800 00	1,849 84
		1,800 00	1,849 84

* To these items must be added the proper proportion of allowances for fuel, gas, electric light, water, cleaning, repairs and incidentals, as between this department and the Main Building maintenance allowances estimated at $1,625

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DETAILED ESTIMATE OF EXPENDITURE, YEAR 1900-1901.—*Concluded.*

Expenses.	Payable out of ordinary revenue.	Amount paid 1899-1900.
	$ c.	$ c.
*15. Mineralogical and Geological Department:		
Supplies and sundries, including students' supplies. Minerals (addition to Ferrier collection)	200 00	215 13
16. Psychological Department:		
Maintenance	500 00	300 00
17. Mathematics	....	....
18. Political Science:		
Class room supplies	25 00	25 00
Books for departmental Library	....	125 00
19. History:		
Class room supplies	20 00	....
20. Classics:		
Greek—Class room supplies	10 00	....
Latin—Class room supplies	20 00	7 50
21. English:		
Class room supplies and provision for reading of essays	100 00	100 00
22. French:		
Books for class room use	20 00	10 00
23. German:		
Class room supplies	40 00	30 00
24. Italian and Spanish:		
Books for class room use	15 00	11 25
25. Oriental Literature:		
Books for class room use	25 00	20 00
26. Stationery (University):		
Office supplies, paper for examinations, postage, etc	900 00	744 48
27. Printing (University)	2,600 00	2,605 84
28. Advertising (University)	200 00	182 63
29. Incidentals (University)	175 00	112 50
30. Stationery (University College)	75 00	75 00
31. Printing (University College)	75 00	75 00
32. Advertising (University College)	100 00	102 05
33. Incidentals (University College)	50 00	29 87
34. Convocation expenses	250 00	255 50
35. Senate elections:		
Allowance to the scrutineers and assistants	....	....
Postage, printing and incidentals	....	....
36. Gymnasium and Students' Union:		
Fuel	350 00	252 81
Water	100 00	103 96
Gas	100 00	76 24
Cleaning	100 00	179 99 (Cleaning; Repairs and incidentals)
Repairs and incidentals	200 00	
Apparatus, labor, etc	200 00	496 36
	1,050 00	1,109 36

* To these items must be added the proper proportion of allowances for fuel, gas, electric light, water, cleaning, repairs and incidentals, as between this department and the Biological Building maintenance allowances estimated at $100.

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TWENTY-SIXTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

1900.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:

PRINTED AND PUBLISHED BY L. K. CAMERON.

Printer to the King's Most Excellent Majesty.

1901.

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WARWICK BRO'S & RUTTER, PRINTERS.
TORONTO.

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TWENTY-SIXTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

FOR THE YEAR 1900.

GUELPH, December 31st, 1900.

To the Honorable JOHN DRYDEN,
Minister of Agriculture:

SIR,—I have the honor to transmit herewith the Twenty-sixth Annual Report of the Ontario Agricultural College and Experimental Farm.

In this Report the work of the year 1900 has been briefly reviewed under the following heads:

PART I. REPORT OF PRESIDENT.

PART II. REPORT OF RESIDENT AND ENGLISH MASTER.

PART III. REPORT OF PROFESSOR OF PHYSICS AND LECTURER IN ENGLISH.

PART IV. REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY.

PART V. REPORT OF PROFESSOR OF CHEMISTRY.

PART VI. REPORT OF PROFESSOR OF VETERINARY SCIENCE.

PART VII. REPORT OF PROFESSOR OF DAIRYING.

PART VIII. REPORT OF PROFESSOR OF AGRICULTURE AND FARM SUPERINTENDENT.

PART IX. REPORT OF PROFESSOR OF HORTICULTURE.

PART X. REPORT OF PROFESSOR OF BACTERIOLOGY.

PART XI. REPORT OF EXPERIMENTALIST.

PART XII. REPORT OF MANAGER OF POULTRY DEPARTMENT.

PART XIII. REPORT OF LECTURER ON APICULTURE.

PART XIV. REPORT OF PHYSICIAN.

I have the honor to be, Sir,

Your obedient servant,

JAMES MILLS,
President.

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THE ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

GUELPH, ONTARIO.

HON. JOHN DRYDEN, Toronto, Ont.

Minister of Agriculture.

STAFF IN 1900.

James Mills, M.A., LL.D.	President
A. E. Shuttleworth, B.A.Sc., Ph.D	Professor of Chemistry
H. H. Dean, B.S.A	Professor of Dairy Husbandry
J. Hugo Reed, V.S.	Professor of Veterinary Science
J. B. Reynolds, B.A.	Professor of Physics and Lecturer in English
C. A. Zavitz, B.S.A.	Experimentalist
Wm. Lochhead, B.A., M.S.	Professor of Biology and Geology
G. E. Day, B.S.A.	Professor of Agriculture and Farm Superintendent
H. L. Hutt, B.S.A	Professor of Horticulture
F. C. Harrison, B.S.A. (who has charge of Library)	Professor of Bacteriology
R. Harcourt, B.S.A.	Assistant Chemist
M. W. Doherty, B.S.A., M.A	Assistant in Biology
I. N. Beckstedt, B.A.	Assistant Resident Master
M. N. Ross, B.S.A.	Fellow in Biology
W. J. Price, B.S.A.	Fellow in Agriculture
A. T. Wiancko, B.S.A.	Assistant Librarian and Tutor in German
W. R. Graham, B.S.A.	Manager and Lecturer in Poultry Department
H. R. Rowsom	Lecturer in Apiculture
Captain Walter Clarke	Instructor in Drill and Gymnastics
W. O. Stewart, M.D.	Physician
G. A. Putnam, B.S.A.	Secretary
A. McCallum	Bursar

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PART I.

REPORT OF THE PRESIDENT.

TECHNICAL EDUCATION.

Just a word on technical education. I am pleased to see the rapidly growing interest of the Canadian people in technical education, using the word "technical" in a broad or generalized sense. For years, some of us have strongly urged the necessity for doing something to give the education in our Public and High Schools more of a practical bearing,—something, during the long period of school life, to turn the attention of boys and girls to their environment, and interest them in the practical duties and responsibilities of every-day life,—something to prevent them from being imbued with the quietly but rapidly spreading idea that the most desirable place for every young man of fair ability and even moderate education is in one or other of the so-called professions. We have spoken and written of this matter for some time past; but, until recently, there has been very little response. At length, however, public opinion has changed, and people of all classes and occupations are beginning to demand some kind of provision for instruction and training in a number of practical branches, such as nature study (soil formation, weeds, insects, etc.), domestic economy, needlework, and manual training—thanks especially to people such as Sir W. C. Macdonald of Montreal, the Massey brothers of Toronto, and Mrs. Hoodless of Hamilton—men and women of large hearts and liberal, progressive views.

In our own Province, the question, under various forms, is engaging the attention of men and women at institute meetings in the rural sections; thoughtful business men in our towns and cities; educationists, from the President of the Provincial University to some of the humblest teachers in the country; and above all, the Minister of Education, who has publicly announced his intention to ask the Legislature this year, the first year of the century, to vote a sum of money to assist him in his efforts to promote and encourage technical education throughout the Province.

It is not known how the Minister intends to dispose of the sum to be voted by the Legislature; but it is hoped that a portion of it may be given as a special, extra grant to Public Schools which teach nature study and domestic economy, including plain sewing, according to a prescribed programme—the grant to be based on the Inspector's report as to the average attendance and proficiency of pupils taking these branches. Something should also, no doubt, go to schools which introduce manual training.

First of all, however, it seems necessary to deal with the High Schools, where the Public School teachers receive their non-professional training. If these schools are passed by and allowed to continue on present lines, where are the Public School teachers to get the special instruction and training to fit them for teaching such subjects as nature study and domestic economy? A smattering obtained in one of the Normal Schools will not serve the purpose. Whatever is required of teachers in the Public Schools should be well taught in the High Schools, and reviewed in its professional application in the Normal Schools. As with English and mathematics, so with nature study and domestic economy.

WORK AT THE COLLEGE.

The work at the College has gone on pretty much as for several years past. The different departments—Farm Proper, Field Experiments, Experimental Feeding, Poultry Department, Experimental Dairy, Horticultural Department, and four Laboratories (Physical, Chemical, Biological, and Bacteriological)—have been busy, as usual, in fact, I might say hard pressed, with research work on various lines and the instruction of classes which have, in several instances, been too large for the rooms and appliances at our disposal for practical work.

The only expenditure on capital account during the year 1900 has been for a model cold storage building and two new boilers—one in the College engine room and the other in the horticultural building, the former to increase our heating capacity and the latter as a safety duplicate of the boiler used to heat the greenhouses. The cold storage building was erected under the supervision of Mr. Hanrahan of the Public Works Department,

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on the plan and according to the principles which gave such good results in the Provincial shipments of fruit to Manchester during the months of September and October. No doubt this building will be an object of special interest to the farmers who visit us in such large numbers during the month of June.

Students in Attendance.

The number of students registered for the Regular Course in 1900 was 259, which is 22 more than the largest attendance in any previous year; and the number in the Dairy Course was 83, making a total of 342. Of this number, 286, or 83 3-5 per cent. (nearly all farmers' sons), came from Ontario, 7 9-10 per cent. from other provinces of the Dominion, 4⅞ per cent. from other British possessions, and 3 4 5 per cent. from foreign countries,—most of these latter (seven in number) having been sent by the Government of the Argentine Republic in South America.

Ages and Religious Denominations.

The limits of age and the average age of students in the Regular Course are nearly the same as last year—limits, 16 to 33 years; average, 20 years. The religious denominations were as follows: *Regular Course*,—87 Methodists, 76 Presbyterians, 39 Episcopalians, 24 Baptists, 15 Roman Catholics, 3 Congregationalists, 3 Christian Association, 3 Disciples, 2 Christadelphians, 1 Mennonite, 1 Church of Christ, 1 Friend, 1 Plymouth Brother, 1 Lutheran, 1 Greek Orthodox, and 1 Free Thinker. *Dairy Course*,—36 Methodists, 24 Presbyterians, 12 Episcopalians, 3 Roman Catholics, 2 Baptists, 2 Lutherans, 2 United Brethren, 1 Christian, and 1 Christadelphian.

Analysis of College Roll (General Course).

(1) From Ontario.

Algoma	1	Kent	2	Prescott	4
Brant	7	Lambton	7	Prince Edward	1
Bruce	3	Lanark	3	Renfrew	2
Carleton	6	Leeds	2	Russell	1
Dufferin	4	Lennox and Addington	4	Simcoe	9
Dundas	8	Lincoln	6	Stormont	2
Durham	3	Manitoulin Island	2	Victoria	2
Elgin	3	Middlesex	8	Waterloo	6
Essex	2	Norfolk	3	Welland	4
Glengarry	2	Northumberland	1	Wellington	12
Grenville	3	Ontario	6	Wentworth	7
Grey	4	Oxford	10	York	19
Haldimand	2	Peel	1	Toronto	13
Halton	4	Perth	5		—
Hastings	1	Peterboro	3		208
Huron	10				

(2) From other Provinces of the Dominion.

Manitoba	1	British Columbia	4	Assiniboia	1
New Brunswick	3	Prince Edward Island	3		—
Nova Scotia	5	Quebec	7		24

(3) From other countries.

Bermuda	1	Island of Mauritius	1	Argentine Republic	8
England	11	Jamaica	2	Sweden	1
United States	2	Asia Minor	1		—
					27

Total in General Course .... 259 | Total in General and Dairy courses .. 342

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County Students.

By legislative enactment, each county council of the Province has power to send one student free of tuition. Of those on the roll in 1900, sixty-one were nominated by county councils and hence were exempt from the payment of tuition fees. The counties and districts which exercised the power of nomination last year (43 in number) were the following: Addington, Brant, Bruce, Carleton, Dufferin, Dundas, Durham, Elgin, Essex, Glengarry, Grenville, Grey, Haldimand, Halton, Hastings, Huron, Kent, Lambton, Lanark, Leeds, Lennox, Lincoln, Manitoulin Island, Middlesex, Norfolk, Northumberland, Ontario, Oxford, Peel, Perth, Peterboro, Prescott, Prince Edward, Renfrew, Russell, Simcoe, Stormont, Victoria, Waterloo, Welland, Wellington, Wentworth and York.

Three or Four New Buildings and Some Alterations Needed.

The very considerable increase in the attendance of students in the last two years has made it absolutely necessary for us either to increase our accommodation or refuse admission to some who apply. We require dormitory accommodation for at least fifty more than we have room for at present; and three of our laboratories (the physical, biological and bacteriological) have become wholly inadequate to the demands upon them for practical instruction. In some instances we have had to divide a class into six sections and repeat the work six times to get once round—a device which involves great waste of a professor's time and meagre training for students.

The following list indicates in outline our immediate needs under this head:

Alterations in present Library and Museum to change them into students' rooms.

Furnishing of rooms (beds, bedding, furniture, etc.) for 50 more students.

Changes in present Reading-room and No 1 class-room to provide a Post-office, a departmental typewriting room, and an office for the President, with furnishings.

A building to provide for the Physical Laboratory, the Biological Laboratory, and the Museum.

Another building, to include a Library, a Reading-room, an Alumni Hall, and two or three Seminary Rooms.

A Bacteriological Laboratory sufficient to accommodate dairy and other students at practical work.

An isolation stable for diseased and other animals for bacteriological research.

A new sheep barn and alterations in present sheep shed to change it into two or three large pens or apartments, for feeding dehorned steers without tying them up.

An additional small building including class-room, plucking room, etc., to equip the Poultry Department for short winter courses.

English.

A considerable number of our students—and some of the very best—enter the College without having learned to speak and write good English. Hence we are obliged to devote what might, perhaps, be regarded as an undue amount of time to this subject. We do not aim at elegance, but we make a determined effort to secure clearness, correctness, and strength. We are still hoping that the time may soon come when we can insist on a higher standard for matriculation.

Physics.

Mr. J. B. Reynolds, our Professor of Physics, is Lecturer in English and, as such, has to spend a large amount of time and energy in teaching the selections and works prescribed from year to year, and in correcting essays and exercises in composition throughout the session. At the same time he gives valuable courses of lectures, with practical demonstrations, in general physics, and special instruction with some practical work in surveying (making measurements, taking levels, and calculating areas), in soil physics, and on plans for cold storage.

This department has also begun some important experiments in soil physics, to determine the immediate and ultimate effects of different methods of cultivation and treatment on the texture, moisture-content, and temperature of the soil. Much work of great practical value could be done under this head, if the Government would give Professor Reynolds a fellow, or grant him even $200 a year for assistance. See Parts II. and III. of this report.

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Biology and Geology.

The work in this department embraces Botany, Zoology, Entomology, and Geology—lectures and laboratory practice—with a large amount of correspondence which grows out of questions about weeds and injurious insects all over the Province.

Prof. Lochhead and his assistant, Mr. M. W. Doherty, have been fully occupied with the regular work of the Department, and have given some attention to investigations and original work under two or three heads:

(1) Observations on the *Buffalo Carpet Beetle*, the *Hessian Fly*, the *Tumble Weed*, and the *Celery Blight*.

(2) Study of *Asparagus Rust* and *Balsam Blight*.

(3) Experiments to determine the effects of Copper Sulphate in the treatment of *Smut* in wheat.

In addition to his teaching, laboratory work, and investigations at the College, Prof. Lochhead spent a considerable amount of time in the inspection of nursery fumigation houses throughout the Province, the preparation of popular scientific articles on insects and fungi for the agricultural press, and the giving of typical lessons on nature study to Public School teachers and others in Guelph and the surrounding neighborhood. See full report in Part IV. of this volume.

Chemistry.

The Chemical Department has made a creditable record this year, not only having given the ordinary instruction and laboratory practice to our students, but having done research work on three or four lines:

(1) *Ash analysis* by Mr. W. P. Gamblo, special assistant in the Department. This work was done according to arrangement with the Association of Official Agricultural Chemists of the United States, by the usual method and by a new method, thought to be a decided improvement, discovered by our Dr. Shuttleworth.

(2) *The analysis of a number of varieties of wheat* by Mr. R. Harcourt, Assistant Chemist and Station Analyist, giving the gluten-content, etc.; making flour, and baking; weighing and testing the bread from all the samples examined,—to determine their respective values from the miller's standpoint. This is valuable work, suggested by the Minister of Agriculture, and it seems to be much appreciated by the Millers' Association of Ontario.

(3) *Some analytic work and digestion experiments*, to determine the feeding value of oat-dust and pea bran.

(4) *The investigation of the beet sugar question*. This work by the head of the Department, Dr. A. E. Shuttleworth, has been extensive and thorough, and the only reliable work of the kind done in the Province. Some years ago C. C. James, Deputy Minister of Agriculture (then Professor of Chemistry in the College), did valuable work in analyzing samples of beets, some grown at the College and others sent here from different parts of the Province, but most of the samples sent were grown pretty much as mangels and other roots are grown for cattle feed. Hence the results in saccharine matter and purity varied so greatly that no one felt warranted in saying whether or not the Province was adapted to the beet sugar industry. In 1900, however, Dr. Shuttleworth conducted experiments on a sufficiently extensive scale, and according to the best known methods, at Aylmer, Welland, and Newmarket,—points some distance apart and fairly representative of the soil and climate of a considerable portion of the Province. In these experiments he used only the best varieties of seed, instructed the growers as to every detail, supervised the whole work—preparation of soil, manuring, sowing, cultivating, thinning, harvesting, etc., and had a large number of representative samples from the three localities analyzed at the College. For the facts and figures of these experiments, see Part V. of this report and a special bulletin recently prepared by Dr. Shuttleworth for publication by the Department of Agriculture.

Veterinary Science.

Our veterinary surgeon, J. Hugo Reed, V. S., looks after the stock on the College farm and delivers courses of lectures on veterinary anatomy, pathology, obstetrics, and materia medica. Besides this, he gives stable lectures to the first year students, and a thorough drill in "practical horse" to the second year, that is, practice, with talks and suggestions,

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in judging for soundness, administering medicine, and performing minor operations. During the past year he has shortened somewhat the time devoted to anatomy, and has given considerable attention to horse-judging in the different classes—heavy-draught, carriage, saddle, etc. For Dr. Reed's report of his work during the year, see Part VI. of this volume.

Dairy School and Experimental Dairy.

Our Dairy School, known also as the "Central Dairy School," continues to do good work from year to year. The attendance was satisfactory last year, as will be seen from the figures given in a previous paragraph; the work done was up to the usual standard, and the interest in the Home Dairy branch was greater than in former years. A considerable number of ladies take this branch, with the addition of a short course of lectures on poultry-raising; and the rules of the school are such that any boy, girl, man, or woman, —married or single—can enter any time, without payment of fee, and remain as long as may suit his or her convenience.

The school course lasts for three months (January, February, March), and when it closes the experimental work begins. Two of our instructors are kept to carry on this work for the following eight months, R. W. Stratton in cheese and J. A. McFeeters in butter, till the commencement of the special Fall Course in butter-making for the regular second year students in the College and all specialists who may come in from outside.

The experiments of last spring and summer dealt with several matters which dairymen consider more or less important:

(1) *Care of Milk in Cheese Factory* by cooling down to 60° or 65° F. at night and the use of a starter to control ripening next day.—Result, satisfactory; method, recommended.

(2) *Washing of curd from bad-flavored milk* with water at 90° to 100° F.—Result: improvement in flavor of cheese; but loss in weight, 1.12 lbs. in quantity obtained from 1,000 lbs. milk.

(3) *Curing of cheese at different temperatures* (continued for last three years).—Result: A temperature of 60 to 65° F. in curing room has given best results so far. A lower temperature may do better. Some will be tried in cold storage in 1901.

(4) *Pasteurization of milk for butter-making* at temperatures from 140° to 200° F.—Result: Flavor satisfactory and keeping quality best from pasteurization at 180° to 185° before separating.

(5) *Reduction of moisture in butter.*—An increase in the amount of working generally decreases the amount of moisture; and an increase in the quantity of salt also decreases the amount of moisture, but the results are not conclusive.

For a discussion of these and a number of other points, I would refer the reader to Part VII. of this report.

Farm Proper and Experimental Feeding.

The Farm Proper.—Under this head will be found a brief review of the year's operations, including a detailed description of the preparation of the land for each crop grown, an account of the revenue and expenditure, and a profit and loss statement for the year.

Experiments in Feeding.—These have been on several lines and may be summarized as follows;

(1) The fourth of a series of experiments in *feeding, light, medium, and heavy rations of meal* to fattening steers. *Result*: The most economical results have been obtained by commencing with a very light ration and gradually increasing. In this way for the whole feeding period, the quantity of meal has averaged about half a pound per steer per day for every 100 pounds of average live weight.

(2) *Corn compared with peas for fattening steers.—Result,* not conclusive as yet Further experiments in progress.

(3) *Comparison of six breeds of swine* (Yorkshire, Tamworth, Berkshire, Chester White, Duroc-Jersey, and Poland China) with regard to economy of meat production and suitability for the English market.—*Result:* The average of five years' tests goes to show

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that, in these breeds, economy of gain is determined by individuality more than by breed. The Yorkshires have been most highly commended by the packers; and, next to them, the Tamworths and the Berkshires in the order named. Generally, the other breeds have been seriously found fault with for being too fat.

(4) Various experiments with swine, to determine *the effects of different foods* upon the rate of grain and the quality of bacon produced. The foods consisted of barley alone, barley with raw roots, barley with cooked roots, barley with corn, barley with oats, and barley with wheat middlings; also corn and middlings; and in one experiment a heavy root ration was used throughout.—*Result: Barley*, fed alone or in combination with oats, middlings, or roots (raw or cooked), has given a good quality of bacon. *Corn* has generally proved unsatisfactory, especially when fed for any considerable length of time, showing a strong tendency to produce a soft quality of bacon. When fed only a few weeks for finishing, it has given good results. So far, roots have given a good quality of bacon, but further tests are in progress, and a more definite statement may be expected later on.

Results of experiments with lambs are withheld until confirmatory tests can be made. For full particulars, see Prof. Day's report in Part VIII. of this volume.

Horticulture.

The work of the Horticultural Department has been on the same lines as last year.

1. *Instruction.*—Courses of lectures, with practical work and demonstrations in greenhouses, garden, orchards, and arboretum, to first, second, and third year students. Many of the students have taken much interest in the work of this department, and have made a creditable record during the past year.

2. *Variety tests*, with strawberries, raspberries, blackberries, currants, gooseberries, and tomatoes. In the report of 1900 will be found the average results from 260 varieties of strawberries fruited during the past five years, 40 varieties of raspberries for four years, 12 varieties of blackberries for three years, 13 varieties of currants for four years, 13 varieties of gooseberries for four years, and 40 varieties of tomatoes for three years.

Alongside our young orchard, we have new plantations containing a large collection of varieties of raspberries, currants, and gooseberries, intended for experimental tests on a more extensive scale.

3. *Tests of flowers and bedding plants*, including a large number of varieties of several kinds, especially geraniums, coleus, chrysanthemums, gladioli, and annuals.

For a detailed account of the work in this department, see Prof. Hutt's report in Part IX of this volume.

Bacteriology.

The head of the Bacteriological Department was in Europe, engaged in special work connected with his department, for a year and a half previous to last November. Hence he has not so much to report as usual; but he refers to several bulletins which have involved a large amount of work, done just before he left, during his absence, and since his return:

(1) "*The Weeds of Ontario*"—a pamphlet of 80 pages, with illustrations, descriptions, and suggestions as to methods of eradication.

(2) "*Foul Brood of Bees*"—a pamphlet of 32 pages, dealing very fully and exhaustively with this most troublesome disease. This bulletin appeared in December, 1900.

(3) Also several original scientific articles published in Swiss and German periodicals.

In the report for the past year will be found also certain proposals made—(1) to dairymen throughout the Province, offering to send out starters and to report upon samples of faulty cheese and butter that may be sent to the department; and (2) to veterinary surgeons, stockmen, and poultry raisers, offering to assist them at any time in diagnosing diseases or ailments that may involve doubt or difficulty.

The report (Part X. of this volume) likewise contains the following sections:

(a) An article on the germ content of pasteurized and unpasteurized milk, by E. W. Hammond, D. V. S., assistant in the department during Prof. Harrison's absence.

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(b) A detailed description of "*The Copenhagen Milk Supply*," by Prof. Harrison.

(c) A translation by Prof. Harrison from the Danish of portions of a work on "*The Struggle Against Tuberculosis*," published in 1900 by Prof. Bang, of the Royal Veterinary College, Copenhagen, Denmark. See Part X. of this report.

Field Experiments at the College.

The work under this head is increasing in interest and importance from year to year.

In 1900 a large amonnt of valuable work was done in testing varieties of farm crops, selections of seeds, dates of seeding, mixtures of grain, methods of cultivation, crops for plowing under as green manure, application of farm-yard manure, commercial fertilizers, etc.

Among the features of special interest, during the past year, might be mentioned the experiments with sorghum, spelt, cow-peas, hairy vetches, soy or soja beans, and bug-proof varieties of peas.

The area of cleared land devoted to pasture in Ontario in 1900 was 2,711,984 acres, and the amount under grass and clover hay was 2,526,566 acres. Hence the importance of a number of experimental tests made during the year with native and foreign varieties of grasses for pasture, mixtures of grasses and clovers for hay, and several annual crops, other than grasses and clovers, for pasture, green fodder, and hay.

Co-operative Experiments Throughout the Province.

The co-operative experimental work of the year has been very encouraging. There were 31 different experiments—nine more than in 1899; and the number of experimenters (many of them ex-students) was 3,354. This large number conducted, each one or more of, the 31 experiments submitted; and they sent in a larger proportion of full and satisfactory reports than in any other year since the work began,—all of which goes to show, not only that the work is extending, but that the experimenters are becoming more efficient and trustworthy.

For detailed information and results under these two heads, see Mr. C. A. Zavitz's report, Part XI. of this volume, and the report of the Experimental Union for 1900.

Poultry.

The manager of the Poultry Department, having had but little help during the year, has been very closely confined and has had to do a large amount of routine work. Nevertheless, he has pushed ahead with several experiments, and has some valuable information to report. These experiments may be very briefly stated as follows:

(1) *Winter Egg Production.*—Under this head Mr. Graham has explained the methods of feeding, etc., which have given him the best results.

(2) *Comparison of pullets with two and three year old hens as layers.*—Result: Pullets very much superior.

(3) *Early Hatching*—Result: A small proportion of eggs found to be fertile, and not much improvement in this respect till April. Eggs from hens having access to a barnyard might have given better results.

(4) *Early Chickens for Broilers.*—Sold some, weighing about 1½ lbs. each, the first week of May, in Toronto, for $1 per pair.

(5) *Young ducks.*—The Pekin, the best variety for the market. First shipment in July, $1 per pair; second lot, 75 cents per pair.

(6) *Fattening chickens*—There was a large amount of work under this head during the year, with results which will be of special interest to farmers and others engaged in poultry-raising. Only one point need be mentioned here, viz., that pure-bred and high grade chickens are much more profitable than common barnyard birds. The former make much greater gain in the same time, and produce the gain at considerably less cost per pound.

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(7) *Rations for fattening chickens.*—Eight different rations were used during the year, with the result that the following was found to be the most satisfactory, viz., 2 parts ground corn, 2 parts ground buckwheat, and one part finely ground oats. This gave the largest gain and at least cost per pound.

(8) *Crammed and uncrammed birds.*—The birds were fed on exactly the same food and treated in the same way, except in the method of feeding. Result: Those fed by cramming averaged $\frac{5}{8}$ of a cent per lb. more than the uncrammed birds; and the report of the dealers was that the crammed birds were better, because they were fleshy without being too fat, while uncrammed birds were fat enough but deficient in flesh.

(9) *Egg Preservatives.*—The result of repeated tests under this head is the same as last year, viz., that the best mixture of all tried here was a solution composed of 1 part water-glass and 7 parts water, both by measure, the water having been previously boiled. This is a very good mixture to preserve eggs for family use.

For particulars, see Mr. Graham's report in Part XII. of this volume.

Bee-Keeping.

We have not a regular department of apiculture; but we have a course of lectures (20 in number), with some practical demonstrations, delivered to our first year students in the Fall Term. The lecturer at present in charge of the work is H. R. Rowsom, of Burlington. Mr. Rowsom was a pupil of Mr. Holterman's; and I was pleased to notice that in his last course of lectures especially, he succeeded in securing the attention of the students and in arousing considerable interest in the subject of bee-keeping.

For Mr. Rowsom's account of his work, see Part XIII. of this report.

Military and Gymnastic Drill.

We do not devote much time to drill; but we think that an hour a day for first and second year students during portions of the Fall and Winter Terms is well spent in setting the boys up and thereby improving both their appearance and their manners. We are fortunate in having Captain Walter Clark, an instructor so well and favorably known, for the work required under this head. He always secures the respect of the young men placed under him, and never fails to straighten them up and improve their general bearing.

Institute Excursions.

We had about the usual number of farmers' excursions in 1900—between 25,000 and 30,000 people—nearly all under the auspices of the Farmers' Institutes; and I am glad to be able to report that the majority of those who visit the College year after year, come, not so much for an outing or mere amusement, as to learn something that may be of use to them in the work or management of their own farms. This explains their coming here for so many years in succession.

Class-Room Work.

The class-room work in the different departments has gone on as usual. Eighteen candidates wrote for the B.S.A. degree in the University of Toronto, and all of them were successful. A fair proportion of first and second year students gained a respectable standing in our College examinations; but the percentage of failures is still very large, resulting in some cases from idleness, but in most instances from a lack of early training in the elementary branches of an English education.

The third year examinations were conducted, as usual, by examiners appointed b the Senate of the University; and those of the first and second years by the professor and instructors of the College, with the assistance of Wm. Tytler, B.A., of Guelph.

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BACHELORS OF THE SCIENCE OF AGRICULTURE.

The examinations for the degree of B.S.A. were held in the month of May, and the successful candidates received their degrees at the commencement exercises of the University in June. The list is as follows:

Anderson, J. B.	St. Marys, Perth, Ont.
Crerar, A. H.	Molesworth, Perth, Ont.
Drury, E. C.	Crown Hill, Simcoe, Ont.
Goble, F. W.	Woodstock, Oxford, Ont.
Hollis, J. H.	Shelly Bay, Bermuda.
Hutchison, J. R.	Escott, Leeds, Ont.
Hutton, G.	Easton's Corners, Grenville, Ont.
Jarvis, T.	Guelph, Wellington, Ont.
Linklater, W.	Stratford, Perth, Ont.
Livingstone, J. M.	Sarnia, Lambton, Ont.
McCarthy, J. D.	Norwood, Peterboro, Ont.
McIntyre, G. A.	Renfrew, Renfrew, Ont.
McMillan, E. J.	New Haven, P. E. I.
Mortureux, C. E. M.	Quebec, P. Q.
Putnam, G. A.	Guelph, Wellington, Ont.
Reade, J. M.	Toronto, Ont.
Robertson, J. A.	Blantyre, Grey, Ont.
Wagg, A. J.	Mindemoya, Manitoulin Island, Ont.

RECIPIENTS OF ASSOCIATE DIPLOMAS.

Black, W. J.	Mansfield, Dufferin, Ont.
*Brouse, A. M.	Iroquois, Dundas, Ont.
Carson, W. J.	Vernon, Russell, Ont.
Christie, G. I.	Winchester, Dundas, Ont.
Cleal, J. P.	Dayton, Ohio, U.S.A.
§Dennis, C. E.	Aurora, York, Ont.
§§Eftyhithes B. M.	Erekleyat, Iconium, Asia Minor.
Hair, W. S.	Watford, Lambton, Ont.
Hallman, E. C.	Washington, Waterloo, Ont.
Harris, W.	Rockwood, Wellington, Ont.
Harris, G. S.	Toronto, Ont.
Jacobs, F. S.	Minesing, Simcoe, Ont.
†Knox, W. G.	Belgrave, Huron, Ont.
Ling, S. M.	Guelph, Wellington, Ont.
McDermid, H. R.	Martintown, Stormont, Ont.
Mills, P. G.	Sussex, New Brunswick.
Murray, Jas.	Avening, Simcoe, Ont.
Moorehouse, L. A	Cairo, Lambton, Ont.
Parker, L. N.	Dunbarton, Ontario, Ont.
Pickett, B. S.	Vittoria, Norfolk, Ont.
Rive, H.	Eramosa, Wellington, Ont.
Rowat, F. N.	Winchester, Dundas, Ont.
Smuck, I.	Renforth, Wentworth, Ont.
Silcox, F. S.	Iona, Elgin, Ont.
Waters, B.	Ivan, Middlesex, Ont.
**Wilson, W. H.	Toronto, Ont.
Williams, R. H.	Corbetton, Dufferin, Ont.

* To take supplemental examinations in Dairying and Veterinary Anatomy.
§ " " examination in Literature.
§§ " " " Agriculture.
† " " " Practical Poultry.
** " " " Materia Medica and Literature.

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First-Class Men.

The work of the College is divided into three departments, and all candidates who obtain an aggregate of seventy-five per cent. of the marks allotted to the subjects in any department are ranked as first-class men in that department. The following list contains the names of those who gained a first-class rank in the different departments at the examinations in 1900, arranged alphabetically:

First Year.

Ferguson, J. F., Spring Hill, Ont., in two departments,—English, mathematics, and book-keeping; and natural science and horticulture.

Laird, J. C., Blenheim, Ont., in one department,—English, mathematics, and book-keeping.

McDonald, W. T., Teeswater, Ont., in one department,—English, mathematics, and book-keeping.

Weekes, H M., Glencoe, Ont., in three departments,—English, mathematics, and book-keeping; natural science and horticulture; and agriculture and veterinary science.

Second Year.

Carson, W. J., Vernon, Ont., in one department,—agriculture and veterinary science.

Harris, G. S., Toronto, Ont., in one department,—natural science and horticulture.

Pickett, B. S., Vittoria, Ont., in two departments,—English, mathematics, and economics; and natural science and horticulture.

Scholarships.

Scholarships of $20 each in money were awarded for groups of subjects in first year work as follows:—

Highest standing, with a minimum of forty per cent. of the marks for each subject and an aggregate of seventy-five per cent. of the total number of marks allotted to the subjects in the group—

I. English, mathematics, book-keeping, and drawing,—*H. M. Weekes.*

II. Mechanics, chemistry, and geology,—*J. F. Ferguson.*

III. Botany, zoology, horticulture, and apiculture,—*D. H. Galbraith.*

IV. Agriculture, dairying, poultry, and veterinary science,—*H. M. Weekes.*

Note.—As no student receives more than one of these scholarships, the scholarship in English was awarded to Alfred Atkinson, another qualified competitor.

Prizes.

Prizes were given as follows:

Essay on "Weeds; Precautions against their Introduction and the Best Means of Destroying Them,"—$10 in books to *W. J. Black*, Mansfield, Dufferin County, Ont.

First place in general proficiency on first and second year work, theory and practice —$10 in books to *B. S. Pickett*, Vittoria, Norfolk County, Ont.

Highest standing in general proficiency, with first-class honors in one department, at the University Examinations for the B. S. A. degree—$10 each in books to *W. Linklater*, Stratford, and *G. A. Putnam*, Guelph, equal.

In the financial statement given below includes only the cash transactions of the farm proper. A profit and loss statement of the farm will be found in Prof. Day's report, Part VIII. of this volume.

JAMES MILLS,
President.

Ontario Agricultural College,
Guelph, December 31st, 1900.

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FINANCIAL STATEMENT FOR 1900.

I. COLLEGE EXPENDITURE.

(a) COLLEGE MAINTENANCE.

1. *Salaries and Wages*	$21,806 50	
2. *Food*:		
Meat, fish, and fowl	5,075 32	
Bread and biscuit	880 43	
Groceries, butter, and fruit	5,208 17	
3. *Household Expenses*:		
Laundry, soap, and cleaning	111 46	
Women servants' wages	1,892 33	
4. *Business Department*:		
Advertising, printing, postage, and stationery	973 23	
5. *Miscellaneous*:		
Maintenance of Chemical Laboratory	344 95	
" Physical "	305 91	
" Biological "	253 20	
" Bacteriological Laboratory	178 11	
Library and Reading Room, books, papers, and periodicals	1,088 35	
Scholarships	63 79	
School Assessment	92 40	
Unenumerated	607 42	
		$38,881 57

(b) MAINTENANCE AND REPAIRS OF GOVERNMENT BUILDINGS.

Furniture and furnishings	698 86	
Repairs and alterations	892 17	
Fuel	3,874 12	
Light	966 57	
Sewage disposal	362 21	
		6,793 93
		45,675 50

COLLEGE REVENUE.

Fees	2,525 30	
Balance on board account after deducting allowance for labor	6,700 30	
Gas used by students in laboratories	75 00	
Supplemental Exams	7 00	
Sale of tuberculin	40 87	
Sale of oil to other departments	9 88	
Refund of books lost by students	1 25	
Contingencies—fines, breakage, etc	145 93	
		9,505 53
Net expenditure for year		$36,169 97

II. FARM EXPENDITURE.

(a) FARM PROPER AND EXPERIMENTAL FEEDING.

1. *Permanent Improvements*—New piggery, etc		$215 99	
2. *Maintenance*:			
Wages of foreman and men	$3,109 19		
Live stock, cattle for feeding, etc	3,544 01		
Maintenance of stock	1,466 33		
Seeds	190 61		
Binding twine	31 25		
Repairs and alterations, blacksmithing, etc	449 79		
Furnishings	80 24		
Tools and implements and new engine	1,046 80		
Advertising, printing, postage, and stationery	31 43		
Fuel and light	45 73		
Experimental feeder	360 00		
Contingencies	142 60		
		10,497 98	
REVENUE.			$10,713 97

Sales of Cattle:		
28 steers, 39,750 lbs. at $5.10	$2,027 25	
15 steers, at $38.00 each	570 00	
3 old bulls	205 00	
6 grade cows	153 00	
5 pure bred calves	309 85	
4 grade calves	10 00	
		$3,275 10

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Sales of Pigs:				
2 pigs, 988 lbs. at $2.75 } Sows and hogs	$27 15			
2 " 718 " 3.25 } Sows and hogs	23 33			
3 " 1,515 " 3.50 } Sows and hogs	53 02			
12 " 2,043 " 4 00	81 72			
17 " 3,114 " 4.50	140 66			
5 " 765 " 4.75	36 33			
16 " 2,316 " 5.00	115 80			
15 " 2,567 " 5.25	134 77			
13 " 2.630 " 5.75	150 76			
14 " 2 813 " 5.90	165 96			
13 " 2,305 " 6.00	138 30			
8 " 1,490 " 6.25	93 12			
51 " no weights	623 50			
		$1,784 42		
Sales of Sheep and Lambs:				
8 lambs, 710 lbs. at $5.00	35 50			
20 " 2,770 " 5.75	130 50			
28 sheep, no weight	218 35			
		384 35		
Sales of Wheat:				
200.56 bus. at 66c	132 62			
30 " at 75c	22 50			
22.45 " at 85c	19 38			
64 " at 90c	57 60			
25 bags at 20c, and 13 bags at 10c	6 30			
		238 40		
Sales of Oats:				
27.30 bus. at 35c	9 75			
33 " 40c	13 20			
11 bags at 20c. and 1 bag at 10c.	2 30			
		25 25		
Sales of Potatoes: 10¾ bus. at 40c		4 30		
Sales of Milk: 9,218 lbs. at from 62 to 72c per 100 lbs		58 32		
2,456½ quarts at 4c		98 26		
Sales of Wool: 317 lbs. unwashed		32 35		
Sales of Hides and Skins: 4 sheep skins, 2.85; 4 cow hides, 11.47		14 32		
Sale of Old Fence Boards		9 00		
Rent of Pasture		10 00		
Service of Animals		127 50		
			6,061 57	
Net expenditure of farm and experimental feeding department, allowing nothing for supplies to College, feed for dairy stock, keep of horses for College and other departments, etc			$4,652 40	

NOTE.—For profit and loss statement, see part VIII.

(*b*) FIELD EXPERIMENTS.

Permanent improvements		$388 99	
Experimentalist—salary	$1,500 00		
Foreman—salary	449 99		
Teamsters—wages	565 05		
Other laborers—wages	2,347 89		
Seeds	401 39		
Manure	157 05		
Furnishings and repairs, blacksmithing, etc	289 47		
Printing, postage, and stationery	120 81		
Implements and tools	48 76		
Contingencies	114 07		
		5,994 48	
Net expenditure on field experiments			$6,383 47

III. DAIRY DEPARTMENT.

(*a*) DAIRY SCHOOL.

Wages of 7 instructors	$1,455 00	
Engineer (3 mos.)	90 00	
General helper (3 mos.)	90 00	
Board of engineer	30 00	
Furnishings, repairs, painting, etc	231 42	
Dairy appliances	217 96	
Fuel and light	289 19	
Advertising, printing, postage, and stationery	96 86	
Books, papers, etc	16 54	
Expenses of Judges	5 50	
Expenses of inspecting factories	19 60	
Milk for use in school	2,819 48	
		$5,361 55

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REVENUE.

Fees	$52 00		
Sales of Butter: 7,585 lbs. at from 22 to 27 cents	1,752 47		
Sales of Cheese: 7,324 lbs. at from 10 to 12 cents	842 49		
Sales of Skim-milk and Whey:			
26,600 lbs skim-milk at 10c. per 100 lbs	26 60		
Whey—season's make	15 00		
Sales of Cream—8½ quarts at 20c	1 70		
Sale of Old Curd Mill	10 00		
Contingencies—Breakages	4 25		
		2,704 57	
Net expenditure of dairy school			$2,657 04

(*b*) EXPERIMENTAL DAIRY.

Foreman (9 mos.)	447 50		
Cheesemaker (9 mos.)	499 95		
Assistant in experimental work (9 mos.)	270 00		
Wages of cattleman, etc	542 24		
Temporary assistance	39 95		
Purchase of milk for experiments	922 30		
Cows	518 99		
Feed and fodder	564 92		
Furnishings and repairs	835 93		
Fuel and light	380 05		
Laboratory expenses—chemicals etc	46 45		
Contingencies	174 06		
Advertising, printing, postage, and stationery	59 15		
		$5,301 49	

REVENUE.

Sales of Butter: 7,058 lbs. at from 15 to 25 cents	1,457 47		
Sales of Cheese: 8,804 lbs. at from 7 to 12 cents	921 54		
Sales of Milk:			
55,255 lbs. at from 86⅔ to 98 cents per 100 lbs	499 00		
1,956½ quarts at 4c	78 26		
Sales of Skim-milk and Whey:			
64,700 lbs. of skim-milk at 10c. per 100 lbs	64 70		
Whey—season's make	10 00		
Sales of Cream: 30 quarts at 20 cents; 103 quarts at 15 cents	21 45		
Sales of Cattle:			
8 grade cows	213 00		
3 pure bred calves	85 00		
14 grade calves	33 95		
Sales of Hides—2 hides	6 55		
Sale of old Engine	20 00		
Sales of Scrap Iron, etc	8 25		
		3,419 17	
Net expenditure of experimental dairy			$1 882 32

IV. POULTRY DEPARTMENT.

Salary of manager		700 00	
Temporary assistance		28 47	
Purchase of stock		56 00	
Furnishings, repairs, etc		239 72	
Feed, etc		203 30	
Fuel, light and contingencies		66 50	
Experiments in fattening poultry		463 76	
			1,757 75

Revenue.

Sales of Eggs:			
For breeding—46 sittings, at $1.00	46 00		
" —33½ sittings, at $1.50	50 25		
For domestic use—590½ doz., at 10 to 25c. per doz	97 47		
		193 72	

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Sales of Poultry:			
103 birds, at 50c. to $5.00		136 65	
56 " 181 lbs., at 8c	14 48		
205 " 778 " 9c	70 02		
60 " 201½ " 9⅝c	19 72		
177 " 658 " 10c	65 80		
61 " 248 " 10¼c	25 42		
95 " 474 " 12⁵⁄₁₆c (net returns of birds shipped to England)	58 51		
31 " 37½ "	11 62		
8 " 40 "	1 20		
		266 77	
Sales of Feathers		1 81	
			598 95
Net expenditure (See Part XII. for additions to stock)			1,158 80

V. HORTICULTURAL DEPARTMENT.

Permanent improvements—Iron staging in greenhouses		226 76	
Maintenance:			
Salary of head gardener and foreman	650 00		
" assistant gardener and florist	540 00		
" assistant in greenhouses	380 00		
Teamster	348 00		
Wages of labourers	1,461 82		
Special assistant for experimental work	90 00		
Manure and fertilizers	109 90		
Seeds, bulbs, plants, trees, etc.	325 24		
Furnishings, repairs, implements, and tools	344 67		
Fuel and light	900 55		
	151 63	5,301 81	
Revenue.		5,528 57	
Sales of fruit and vegetables	33 38		
Paid by Professors Hutt, Harrison, and Shuttleworth for private use of gardener's team	12 66	46 04	
			5,482 53

NOTE.—Ordinarly there is no revenue from this department, because the produce is used by the College, and the department is forbidden to sell even the surplus.

VI. MECHANICAL DEPARTMENT.

Salary of foreman	700 00	
" extra carpenter	350 00	
Tools, fuel, and light	74 64	
		1,124 64

SUMMARY.

Total net expenditure:		
I. College and Government Buildings		36,169 97
II. Farm:		
1. Farm Proper and Experimental Feeding Department	4,652 40	
2. Field Experiments	6,383 47	
III. Dairy Department:		11,035 87
1. Dairy School	2,657 04	
2. Experimental Dairying	1,882 00	4,539 36
IV. Poultry Department		1,158 80
V. Horticultural Department		5,482 53
VI. Mechanical Department		1,124 64
Total net expenditure in 1900		59,511 17

JAMES MILLS,
President.

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PART II.

REPORT OF ENGLISH AND MATHEMATICAL MASTER.

To the President of the Ontario Agricultural College :

SIR,—In superintending studies, I have endeavored by watchfulness and a judicious use of authority to promote order and attention, and maintain conditions favorable to close application. It has been my practice to make brief calls at the rooms during the study period, and to pass through the halls and corridors several times each evening, in order to guard against neglect of duty and unwarranted absences. With few exceptions, the students have been careful to observe the regulations regarding study ; and my best judgment is that nearly all are doing excellent work. I may say, too, with reference to the effect of systematic study, that many students, who, on entering upon their course, found it difficult to read and think continuously, have developed considerable power of application.

Regarding the college dining-hall, I am pleased to be able to report that a very fair degree of order and decorum has been maintained, the students generally having shown a disposition to accept advice, and act upon the suggestions that have been made from time to time. There are, however, certain features in connection with the dining hall that do not seem to me altogether satisfactory : the accommodation is somewhat inadequate, giving rise to more or less embarrassment ; it sometimes happens that a number of students are not able to assemble in the dining-hall with the others precisely at the regular hour, owing to the demands of the work in the outside departments, with the result that considerable time elapses before all are seated.

With reference to discipline, I wish to say that it has been comparatively easy to maintain order in the residence. This is mainly due, I think, to the growth of an *esprit de corps* among our students. Gross misconduct is not tolerated among them, and there seems to be a general desire to uphold the dignity of the college. It is gratifying to note the steady improvement in this phase of college government ; for it indicates that moral education is advancing, and that the sympathies of students have not been alienated by injudicious methods.

My class-room work comprises lectures in English grammar, composition, mathematics, drawing and book-keeping. In giving instruction in these subjects, I have met from three to four classes each day during the two terms.

The work in English has been practical in its bearings, only such technical points as seemed indispensable having been introduced. Special attention has been given to syntax, as being, from a practical point of view, the most important part of grammatical study. The writing of fortnightly essays and the punctuation of typical passages, have also formed an important part of the work in English. In addition to the regular work, I was also called upon to give a series of lessons to the students from the Argentine Republic. These young men are found to be very intelligent and apt ; and they made rapid progress.

The course in mathematics has also been very practical, comprising the measurement of land, lumber, timber, masonry ; mensuration, with special reference to the properties of the triangle and circle, and the determination of the cubical contents of such solid figures as the sphere, the cylinder, prisms, and the cone and pyramid, with their frusta ; a thorough drill in vulgar fractions and decimals ; a fairly extensive course in commercial arithmetic ; and practical geometry, based upon Euclid's elements,—Book I. for first year students, and Books I., II., and III. for senior students.

The course in drawing comprises the drawing of plans for barns and outbuildings, some drawings being original, others from models ; and geometrical drawing, comprising figures such as might occur in connection with the mechanics of the farm.

The work in book-keeping comprises commercial forms, business correspondence, and the keeping of practical accounts.

Respectfully submitted,

I. N. BECKSTEDT,
English and Mathematical Master, and Dean of Residence.

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PART III.

REPORT OF THE PROFESSOR OF PHYSICS.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith my report on the work in the departments of English Literature and Physics.

ENGLISH.—I am pleased to report that there is a continued and even an increasing interest in the study of English literature. At the same time there is a growing conviction among our students as to the importance of being able to speak and write well. In response to this growing interest, while not neglecting the teaching of literature as such, I have extended considerably the work in composition. Beginning with the first year, the subject of composition is taken up under the following heads:

1. The formal study of composition and rhetoric, with a text-book.
2. The study of models of English prose; such as, in the first year, Washington Irving's Sketch-Book.
3. Practice in composition; each student being required to hand in, at stated periods, essays for correction and valuation.
4. Discussion on these essays in class, after they have been corrected and evaluated.

It is gratifying also to report that an improvement in the style and method of writing among the students is very noticeable from the beginning to the end of the course. And I wish at this juncture to say that there is no more important part of our course than the English branches. A young man passing from the College may be deficient in any of the sciences and may keep his deficiency to himself. But if he lack ability to use his mother tongue correctly and effectively, his bad English will display itself with every sentence he utters or writes. I have shown my estimation of the importance of this work by increasing considerably the amount of time devoted to it. So that at present the students spend, I think, as much time at essays as they can spare. Also a large proportion of my own time and of my assistant's is taken up in correcting the essays handed in.

The past year the College Literary Society repeated their commendable undertaking of the year before, in offering prizes for oratory, and setting aside an evening for hearing and judging the speeches. As one of the judges in that contest, I am glad to be able to report the excellence of the orations delivered. The quality of these orations indicates that no small number of our students can think clearly and correctly, and speak fluently; and that good work is being done by the Literary Society in affording opportunity for the exercise of this talent.

MATHEMATICS.—A weak arm in our course of studies has been, and still is, that of mathematics. The immediate uses to which a knowledge of mathematics can be put are:

1. The measurement of lumber, grain-bins, quantities of roots, etc.—requiring expertness in mensuration.
2. Planning and constructing buildings, and estimating cost of same—requiring mensuration and geometry.
3. Surveying—requiring algebra, geometry, and trigonometry. In order to strengthen this part of our course, algebra and geometry are being gradually introduced, and it is hoped that before long the instruction in mathematics will be as near the required standard as that in other departments.

PHYSICS.—The sub-divisions of this department of instruction remain much the same as outlined in my last report, with the exception of surveying. It is necessary, therefore, to outline only the latter subject.

Surveying.—The earlier opening of the College for the fall term—on the fourteenth of September instead of, as formerly, the first of October—afforded this year an opportunity for a good course in practical surveying in the fields and on the lawn. From the beginning of the term to November the first, each student of the second year received two afternoons a week of practical instruction in surveying, and two lectures a week through the whole term on the same subject. The work covered in lectures and practice consisted of such exercises as the following:

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1. Geometrical exercises—erecting perpendiculars, running parallel lines, tracing ellipses, and measuring lines wholly or in part inaccessible.

2. Running and continuing lines past obstructions: For instance, a line of fence runs into a building, and it is required to continue the fence past the building in the same straight line. Also, running a line over a hill, given the two extremities of the line.

3. Measuring fields of all shapes and sizes with the surveyor's chain and estimating the area.

4. Drawing plans of fields previously measured, showing the position and line of direction of all boundaries, of roads and creeks intersecting the field, of clumps of trees, and buildings.

5. Estimating with levels the slope of ground in fields for the purpose of finding the proper location for drains.

6. Surveying with a transit—measuring angles between the boundaries of fields.

7. Calculating the area of farms from the surveyor's description, as given in deeds.

The work in surveying requires some knowledge of geometry and trigonometry. What is absolutely essential in these subjects I have supplied incidentally in the course of lectures on surveying. But it would be much more satisfactory to the students if they could become familiar with the mathematical principles before they were required to apply them.

CORRESPONDENCE.—While my correspondence is not heavy, I received during the year many letters relating to drainage, water supply on farms, ventilation of buildings and cold storage. Questions on drainage are usually accompanied by samples of soil to be examined as to their physical properties, while other questions require for answer plans and descriptions more or less in detail.

INSTITUTE LECTURES.—In the month of June I delivered five lectures at Farmers Institutes. The Institutes afford those connected with the College an opportunity that should not be neglected—of meeting the farmers of the Province, exchanging ideas with them, and finding out their special needs. And the month of June is the ideal time for Institute lectures, since the season is favorable for the observation of different modes of farming, and presents immediate object lessons in each district that may be used with good effect as illustrations.

COLLEGE DUTIES.—On your departure early in July for Europe, the Minister of Agriculture requested me to perform temporarily the duties of Principal of the College. Of my four months' experience in this work I have little to report. The summer at the College passed uneventfully, and the students who remained at the College were well disposed and occasioned no anxiety.

Toward the end of August the applications for admission to the College had taxed the residence capacity to the utmost; and by September the first it became necessary to inform applicants that while they could be admitted to lectures, they would be required to occupy lodgings outside. In a number of cases this reply discouraged the applicants from entering the College this year, these preferring to wait until they could secure full accommodation in the College. It is evident that the time has come when the College residence must be enlarged or applicants must be refused. I happened to make an examination of the class-lists for some years back, and observed that while the attendance in the second and third years has been steadily increasing, the number in the first year increased steadily up till this year, when there is a slight falling off. This is due, without doubt, to our lack of accommodation, which, on account of our regulations giving preference for residence to old students, has so far affected the number of new students only.

COLD STORAGE EXPERIMENTS.

The following is a report of some experiments on temperatures and consumption of ice in a refrigerator.

The refrigerator with which the experiments were conducted can best be described by reference to the accompanying illustrations. From figure 1 the general plan may be seen. The door at the top opens into the ice-box, and the one in front into the cooling chamber. It should be noticed that galvanized iron tubes, three in number, stand on each side of the

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cooling-chamber, extending from the top to the trough at the bottom. These tubes with the trough serve incidentally to carry off the water from the ice-box; but their principal function is to hold a mixture of ice and salt, which mixture is to take the place of the ice in the box, when it is desired to reduce the temperature of the refrigerator to a lower degree than can be reached by the use of ice alone. Small openings were made at the top over the air spaces in the walls, so that a thermometer might be suspended in the air-space, as shown in Figure 2.

Figure 2 is a vertical section of the whole refrigerator, showing the relative positions of ice-box, cooling-chamber, tubes, and trough. The walls, ceiling, and floor are constructed on the same plan, as follows: $1\frac{3}{4}$ inch. studding having on each side two thicknesses of $\frac{7}{8}$ inch. matched lumber (spruce), with a layer of building paper between each two thicknesses of spruce.

Figure 3 shows a transverse section of part of the wall.

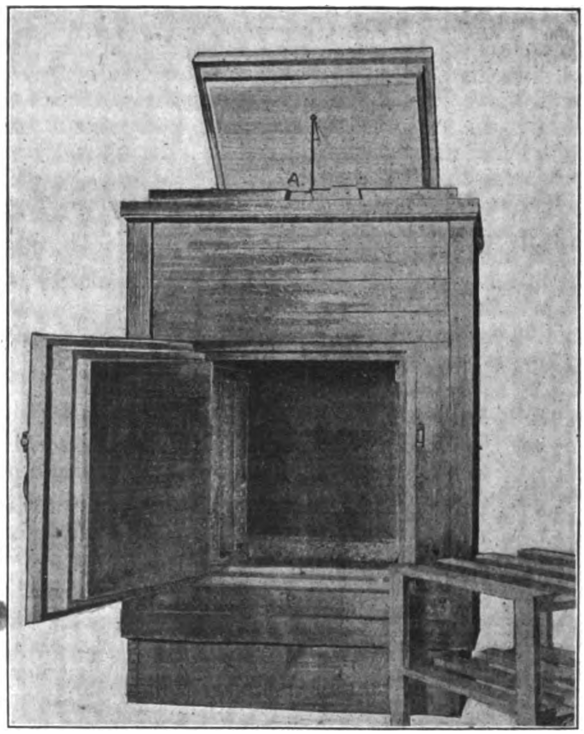

FIG. 1.—A simple refrigerator constructed by the College carpenter for experiments in refrigeration.

Purpose of the Experiment.—The purpose of the experiment that we have been able thus far to conduct was, to determine the amount of ice that would be consumed by the absorption of heat through the walls of a refrigerator of given dimensions, constructed after the same plan as the one used in the experiment, which plan is that recommended in the instructions on Cold Storage issued by the Dominion Government. We endeavored to obtain a *radiation-co-efficient*, that is, the number of units of heat that would radiate through a square foot of the wall of this refrigerator in twenty-four hours, with a difference of temperatures of outside and inside air of 1° F. A unit of heat may be defined as that quantity of heat-energy required to raise the temperature of 1 pound of water 1° F.

The amount of ice consumed by an empty refrigerator depends on these conditions:—

1. The area of the walls, floor, and ceiling through which radiation proceeds.

2. The character of the walls with respect to the insulating power, or power to exclude the external heat.

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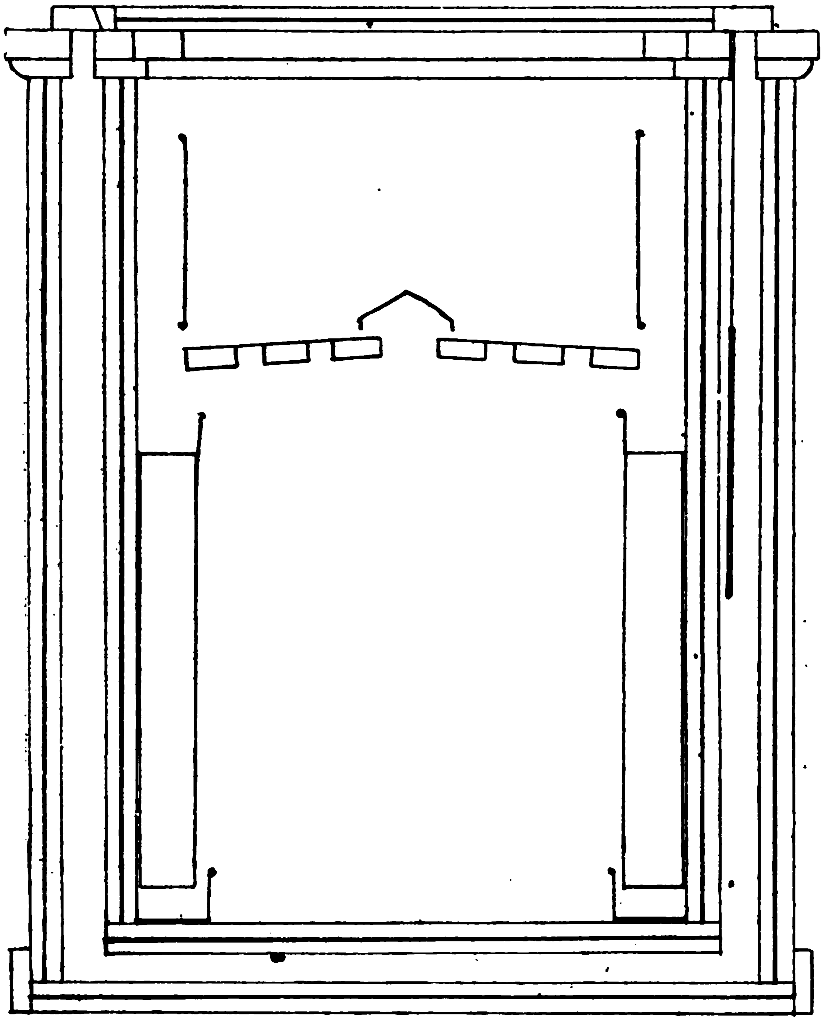

FIG. 2.—Vertical section of the refrigerator.

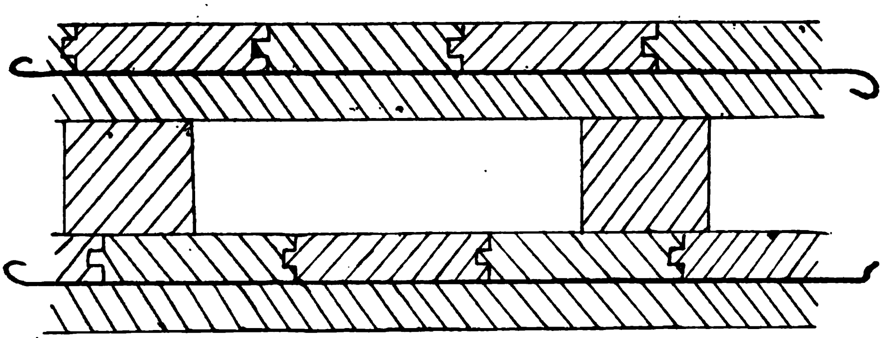

FIG. 3.—Transverse section of part of the refrigerator wall.

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3. The difference between the temperatures of the outside and inside air.

After these conditions have been taken into account the amount of ice required to keep the refrigerator at a given temperature is independent of the cubical contents of the room. Also, when once the air of the refrigerator has been cooled to the required temperature, it will remain at that temperature without the consumption of ice if no heat from the outside can radiate through the walls. Further, when once the stored products have been cooled to the temperature of the refrigerator, the amount of ice consumed is not affected by the products; that is, the same amount of ice is consumed by an empty refrigerator as by one filled with produce, provided that the produce has been once cooled and that no fermentation is taking place.

Details of Experiment.—The experiment was conducted by keeping the ice-box supplied with ice, filling up each morning; reading the temperatures of the outside air, the air in the refrigerator and ice-box, and in the space in the walls; and estimating the quantity of ice consumed per day. This last was done by collecting the water escaping from the trough through the spout behind.

Result.—The result of twenty days' experiments were averaged, and the factor for radiation found to be 4.25. That is, 4.25 units of heat were absorbed through one square foot of wall, floor, or ceiling in twenty-four hours, for each degree of difference in temperature between the outside and inside air.

This factor 4.25 may be applied to calculate the consumption of ice in all buildings, large or small, constructed after this pattern. For instance, a refrigerator eleven feet by eight feet and seven feet six inches high, kept at a temperature of 35° F., with an outside temperature of 70°, would consume 260 pounds of ice in twenty-four hours; while to cool 400 pounds of butter from 60° to 35°, would require thirty-seven pounds of ice. Hence, for every pound of ice consumed in cooling this amount of product, seven pounds are consumed by the heat radiating in through the walls of the refrigerator.

The Hanrahan System.

The Department of Agriculture has issued plans and specifications for a system of cold storage, known as the Hanrahan System; and an illustration building has been erected here under the personal supervision of Mr. J. F. Hanrahan of Ottawa.

The *essential features* of this system are, first, that the ice-house is in connection with the refrigerator, so that the two parts form a complete circuit for the air. The air of the refrigerator, having been warmed by the products stored therein, ascends a flue between the two parts of the building, and at the top of the flue passes over into the ice-house, where it is cooled and gradually falls to the floor. The ice rests on large slats at the floor and the air is drawn below the ice and between these slats towards the refrigerator, and thus the circuit is completed. Secondly, it is claimed on behalf of this system that the moisture and impure gases that may be given off by the products are got rid of by the ice while the air is being cooled (the moisture being precipitated and the gases dissolved and carried away in the water from the ice), so that the air returns to the refrigerator cool, comparatively dry, and pure. The excellent method of insulation is a third feature of the system. Plans and specifications for buildings on this system may be had on application to the Department of Agriculture, Toronto.

The dimensions of the building that has been erected here are as follows: Ice-house, 12 x 12 x 20; refrigerator, 10 x 12 x 7. Supposing that 400 pounds of butter per day were stored in the refrigerator, the quantity of ice consumed would be, per 24 hours:

By radiation of heat through walls, etc., of ice house..........	700	pounds.
By radiation of heat through walls, etc., of refrigerator........	220	"
By radiation of heat from the cooling butter..............	37	"
Total	957	"

Of this amount of ice consumed daily only four per cent. is required to cool the products stored. So that 96 per cent. of all the ice consumed is wasted—that is, is not applied to the purpose for which the building was constructed. Or, to put the case in another way, to store a quantity double of that supposed in the foregoing instance—800 pounds of butter daily would require only four per cent. more ice. The quantity of ice consumed depends, therefore, almost entirely upon the character of the insulation and the area of the walls, and is affected but slightly by the amount of produce.

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Conclusions.—To obtain a sufficiently low temperature in the refrigerator, and at the same time to economize in the use of ice it is exceedingly important, first, that the insulation be as perfect as possible; and secondly, that the building be no larger than is necessary. With reference to the latter point, all the dimensions should be calculated carefully before building, especially the relative sizes of refrigerator and ice house.

A Hint on Insulation.—Our experiment with the refrigerator showed in an interesting way the value of a dead-air space in the walls of the refrigerator. An average of 22 days' readings gave the temperature of the air outside of the refrigerator to be 68.5°. That of the inside air was 43.3°, and that of the intermediate space was 56.4°—just half a degree above the *mean of the two extreme temperatures.* Hence the effect of the dead air space is to reduce the effective difference of temperature by half; and consequently, to reduce the consumption of ice by half. This effect of the intermediate air space seems to be independent of the width of that space, a two-inch space being just as effective as a six-inch space. This will not hold, however, unless the air is perfectly motionless.

REPORT OF RAINFALL AND TEMPERATURES FOR THE YEAR 1900.

Month.	Maximum temperature.	Date.	Minimum temperature.	Date.	Depth of rain, in inches.	Depth of snow, in inches.	Number days of sleighing.
	Degrees		Degrees				
January	45.5	20	— 6.5	31	.920	10.5	16
February	56.8	9	—14.0	26	.880	25.9	22
March	46.0	3	— 4.0	5 and 15	.170	11.5	27
April	77.0	29	19.0	9	1.690	....	....
May	83.0	14	27.0	5 and 6	1.030	....	....
June	86.0	26	42.5	30	4.465	....	....
July	89.0	5 and 6	41.0	1	3.051	....	....
August	96.0	6	47.0	2	.870	....	....
September	90.0	2 and 11	37.5	18	1.515	....	....
October	84.0	6	24.5	17	2.905	....	....
November	66.0	8	15.0	14	2.050	11.4	5
December	49.0	8	— 4.0	14	.465	2.4	....
	....	....	....	....	20.011	61.7	70

Compared with last year, the weather was much warmer and we had considerably more rain:

—	Maximum temperature.	Date.	Minimum temperature.	Date.	Total precipitation, melted snow and rain.
	Degrees.		Degrees.		
1899	95	August 19	—20.5	February 12	19.77
1900	96	August 6	—14.0	February 26	26.181

SOME EXPERIMENTS IN SOIL TEMPERATURES, AS AFFECTED BY COLOR AND THE MOISTURE CONTENT OF THE SOIL.

An experiment in this direction was reported last year; and the following report is a continuation and extension of that work.

In the months of April, June, and July experiments were conducted with six kinds of soil, with a view to ascertain the power of these different soils to absorb and retain the sun's heat. The six kinds of soil were, (1) pure black humus or vegetable matter, (2) a potting soil as used in the green-house, and composed of about 65 per cent rotted sod, 20 per cent farm yard manure, and 15 per cent sand; (3) clay loam, (4) heavy clay, (5) coarse sand, and (6) fine sand, almost white in color.

Two sets of these samples were used, one set being kept dry and the other wet. The experiment was conducted outside, where the soils were exposed to the full influence

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of the sun and wind. The temperatures were observed every hour from 8 a.m. to 8 p.m From the accompanying chart, Figure 4, the rise and fall of temperature during the day may be noted.

It is to be observed that in some places there are indentations in the curves. These are due to cloudiness occuring at that part of the day corresponding to the indentations. In every case the dry soil is much warmer than the wet; and the variations in temperature shown by the indentation and due to daily weather-variations, are nearly twice as great in the dry soil.

With regard to the absorption of heat, the humus as a rule reached a higher temperature than any other soils. This higher temperature is due undoubtedly to its color. The dark potting soil also reached high temperatures, in one or two cases even than that of the humus. The more open clay was considerably warmer than the heavy clay. This difference is due partly to the difference in color, the heavy clay being lighter in color; and partly to the better aeration of the open soil. The fine white sand was coldest of the six samples.

TEMPERATURE OF THE AIR AND CONDITIONS OF SKY DURING EXPERIMENTS.

Hour.	July 13. Temperature of Air, Max., 76.5; Min., 54.5.	July 12. Temperature of Air Max., 69; Min., 52.	July 6. Temperature of Air, Max., 89; Min., 61.
8 a.m.	b in shade	c c	b shade
9 "	b	c c	b c
10 "	b	c c	b c
11 "	b	c	b
12 "	b c	c c	b
1 p.m.	b c	b c	b
2 "	b c	b c	b
3 "	b	b c	b c
4 "	b	b c	b c
5 "	b	b b c	b c
6 "	b in shade	b in shade	b shade
7 "		b in shade	b shade
8 "		b in shade	b shade

KEY.—c.c., whole sky covered by clouds; c., cloudy; b.c., few clouds; b., blue sky.

ABSORPTION AND RETENTION OF HEAT BY SOILS.—A soil that warms rapidly may be expected, other things being equal, to cool rapidly, and conversely. And while this is generally true it is interesting to note that there is an expection in favor of soils containing humus. Our experiments show that the humus remains steadily warmer than the other soils. The following table shows the temperature-qualities of the various soils, averaged from eleven days' readings:

—	Rise in temperature from morning till noon.	Fall in temperature from noon till evening.	Net increase in temperature for the day.
	Degrees.	Degrees.	Degrees.
Humus	27.5	24.5	3.0
Potting soil	27.3	26.1	1.2
Clay loam	26.6	25.0	1.6
Heavy clay	25.4	22.9	2.5
Coarse sand	27.0	25.0	2.0
White sand	23.8	19.8	4.0

A NOTICE OF SOME WORK NOT YET COMPLETED.

We have some further results on cold storage: but the experiments are not yet complete, and it is thought advisable to hold these over until another year, to give an opportunity for completing the plan of the experiments and reaching reliable conclusions. These experiments are intended to show the efficiency of freezing mixtures for refrigerating purposes, different proportions of ice and salt being used instead of ice alone.

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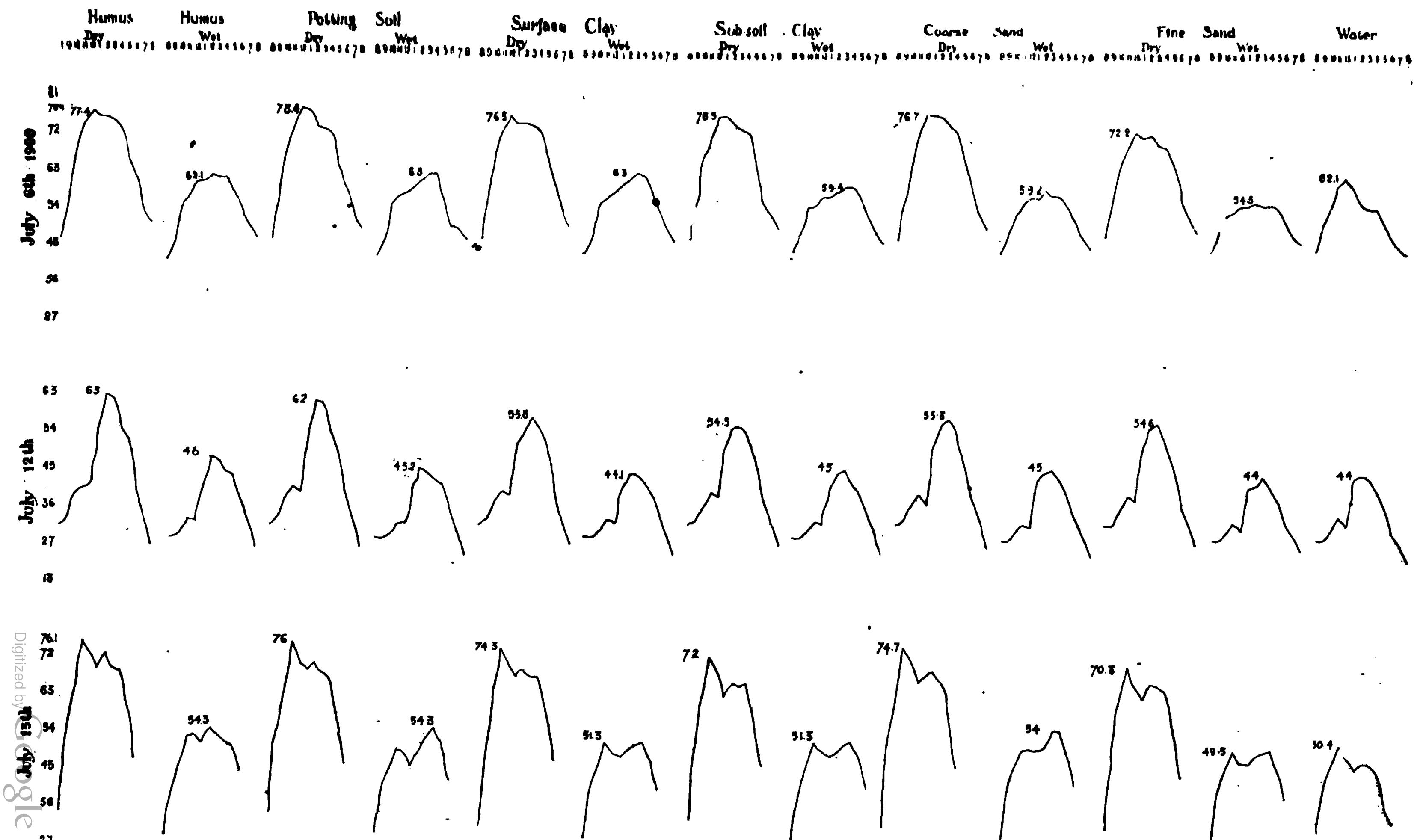

FIG. 4.—Chart showing variations of temperature in different soils during stated period.

The new Hanrahan Refrigerator will afford a good opportunity to investigate the efficiency of this system in preserving low temperatures, and in drying and purifying the air of the refrigerator. This work will be carried on in conjunction with the Dairy, Poultry and Horticultural Departments.

A BULLETIN ON VENTILATION.—Last summer I spent some time in correspondence, inquiry, visits and investigation, collecting material for a bulletin on Ventilation of Farm Buildings. This bulletin, which will be liberally illustrated, is now about ready for publication. I have tried to find out the most practicable, economical and efficient methods of ventilating stables and houses—methods actually in use and known to have given satisfaction. These various methods are fully described, and their merits and defects discussed.

ASSISTANCE.

If permanent assistance could be secured for this department a great deal of valuable work could be accomplished in investigation. Without assistance and with two heavy teaching departments, it is quite impossible to attend to the details of investigation work. Further, with an assistant, more efficient work could be accomplished in a very necessary part of the English branch, the reading and correcting of essays. The amount of work that can be done in this line is at present limited by the amount of time at the disposal of this department.

With the aid of a supplemental grant I have been enabled to obtain the services for part of the year of Mr. R. D. Craig, B.S.A. Mr. Craig has proved himself both capable and willing; and in correcting the essays of the different classes, in assisting at practical instruction, and in occasional lectures, he has been both efficient and painstaking.

NEEDS OF THE DEPARTMENT.

The space allotted for instruction in physics is at present no more than it was five years ago. Then only one class,—the Second Year—received instruction in physics. The method of instruction then was almost altogether by lectures, the laboratory method not having been developed at that time. Now, instruction is given to all four classes in attendance at the college, and each class receives, as far as it is possible to give it with our accommodation, practical instruction in the laboratory as well as lectures. At than time—five years ago—a class room was all that was required, with a lecture and demonstration table and a laboratory table in the same room. A seating capacity for 40 students was ample then, but since that time the seating accommodation has been increased to 48, all that the room will hold. But with an attendance of 60 in the second year, as we have at present, this accommodation is quite inadequate; consequently, I am compelled this year to divide the class in two and repeat the lectures in physics. To be properly equipped this department requires:

(1). A class-room much larger than the present one.

(2). A large laboratory for practical work in mechanics, the indoor work in surveying and general physics.

(3). A laboratory for soil investigations.

Respectfully submitted,

J. B. REYNOLDS,

Professor of Physics.

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PART IV.

REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY.

To the President of the Ontario Agricultural College:

Sir,—I beg to submit herewith my third annual report of the work done in the Department of Biology and Geology during the year 1900.

From the time I assumed charge of this department, it was always my aim to lay special emphasis on practical laboratory work in order that the students might come into direct contact with flowering plants, fungi, and insects. It is true that my aim has not been realized in every case, but the chief reason has been the lack of laboratory accommodation and equipment, and museum facilities. I pointed out in my last report the pressing need for better accommodation and equipment; and as the number of students has materially increased this session, I again urge the necessity for an immediate remedy of such deficiencies. So long as the present state of things exists, it will be impossible to give proper laboratory instruction in this department.

The work carried on during the year falls naturally into five divisions: (1) Class-room and laboratory instruction; (2) Correspondence; (3) Outside work; (4) Articles contributed to agricultural papers and scientific societies, and (5) Investigations.

Class-room and Laboratory Instruction.

By far the greater portion of our time was devoted to teaching; and as students of all the three years received instruction in the subjects embraced in Biology and Geology, the work was by no means light; in fact, it occupied fully the time of both myself and my assistant, Mr. Doherty. Briefly, the instruction given was as follows:—

Botany, First Year.—(a) Field excursions, where the student familiarizes himself with the means of the common wild plants, learns their manner of growth, and the way the fruits and seeds are produced and disseminated; (b) laboratory studies of the entire plant, including root, stem, leaves and fruit; and (c) lectures summarizing and illuminating the practical work.

Botany, Second Year.—(a) Laboratory study on the morphology of plants, and their classification; a critical study of weed seeds, and an elementary course in the study of grasses and fungi; (b) lectures (two every week) on the morphology, classification, and physiology of plants.

Botany, Third Year.—(a) Laboratory course on the morphology of typical cryptogams, such as Pleurococcus, Spirogyra, Vaucheria, Mucor, Uncinula, Puccinia, Agaricus, Marchantia, Pteris, Equisetum, Lycopodium, Selaginella, Isoetes, with the common flowering plants including the grasses and an elementary course of five weeks in the histology of plants; (b) Lectures (three every week) on the morphology, physiology, and classification of plants.

Botany, Third Year Specialists in Agriculture.—A practical course in Fungi, in which the chief fungous pests of the farm are considered and studied.

Botany, Third Year Specialties in Botany—(a) A practical laboratory course accompanied with lectures, on the chief fungous pests of the farm, orchard and garden; (b) an advanced laboratory and lecture course in plant histology; (c) a practical laboratory course in plant physiology, accompanied by illustrative lectures; (d) a laboratory and lecture course dealing with the chief Cryptogamic types.

Entomology, First Year.—For the first time, a short course of four lectures on insect life was given to the First Year Students, the object being to show the great economic importance of the subject. These lectures also embraced something on methods of collecting and preservation, and on the life-histories of a few common insects, such as the house-fly, mosquito, squash-bug and cabbage-butterfly.

Entomology, Second Year.—This course of 35 lectures and demonstrations is made as practical as possible with the laboratory accommodation at our disposal. The chief insect pests of the farm, orchard and garden are discussed and studied.

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ENTOMOLOGY, THIRD YEAR, SPECIALISTS IN AGRICULTURE.—This course, consisting of lectures and practicals, deals with both beneficial and injurious insects, and is a continuation of the Second Year course. Here, the students become acquainted with the literature of the subject.

ZOOLOGY, FIRST YEAR.—So far, this course, owing to lack of room, consists entirely of lectures and demonstrations, thirty in all. The chief animal types from the Amoeba to the Mammals are discussed at some length.

ZOOLOGY, THIRD YEAR, SPECIALISTS IN BIOLOGY.—(a) A laboratory course in which the main types of the classes of the animal kingdom are dissected; (b) a lecture course; (c) a study of the physiological activities of the animals dissected.

GEOLOGY, FIRST YEAR.—A course of 30 lectures and demonstrations dealing with the common minerals and rocks, the chief agencies operating in the formation of soils, and the geological history of the rock formations of Ontario.

GEOLOGY, THIRD YEAR.—This course is a continuation of the First Year course; but it is of a more practical nature, because the class is smaller. Considerable attention is given to the formation of soils through glacial action; and the geological history of North America is studied, with special emphasis on the Canadian region.

CORRESPONDENCE.

This division of our work is gradually growing in importance. The number of letters, excluding circulars, sent out from this department during the year exceeded 1,000, and indicates to some extent the amount of the information given to farmers and fruit-growers regarding weeds, fungi and insects. As usual, many of the answers sent to inquiries for information were lengthy, and required considerable time for preparation.

Besides the correspondence relating to insects, etc., more than 200 letters were written in connection with the Fumigation Work, required as a protection against San José in the nurseries of the Province.

The following is a fair estimate of the year's correspondence:

Insect pests of farm and garden	300	letters
Weeds, identification and treatment	350	"
Fungous diseases, identification and treatment	150	"
Foreign correspondence	75	"
Miscellaneous	125	"
Fumigation	250	"

OUTSIDE WORK.

As Inspector of Fumigation Work in the nurseries of Ontario, it is necessary for me to visit as many of the nurseries as possible, and ascertain to what extent the instructions of the Minister are being carried out. During April I visited all the nurseries east of Toronto, and two in the vicinity of Guelph. In October I inspected some of the fumigation houses in Essex. So long as I have charge of this inspection, my college work during the month of April will be somewhat interfered with.

At the request of the Minister of Agriculture, I carried on, with the assistance of Mr. G. E. Fisher, a series of spraying experiments during January and February in the districts infested with the San José Scale. The object of these experiments was to determine the best insecticides to use against the scale.

Nature-Study in the public schools has been encouraged, as in former years, by the publication of short lessons on some of the more common objects, by the delivery of Nature-Study addresses at teachers' conventions, and by the formation of Nature-Study classes among the teachers themselves. In the case of the Guelph city teachers, excursions were organized and conducted every Saturday afternoon during most of September and October. Much interest was apparently aroused in the study of the common trees, plants and insects, and especially in the study of the fruits and seeds, with special reference to the modes of distribution.

It is evident that something of permanent, practical value would be introduced into our school course if more attention were given to Nature-Study, that is, to the study of

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the common, every-day objects about us, no matter whether these be stones, plants, insects, birds or fishes. We are willing to do all we can to further the movement—to lend our aid in the distribution of knowledge regarding the objects of nature. In many of the States the task of providing Nature instruction to the young has been assigned to the Agricultural Colleges, and it would appear as if similar work in Ontario will have to be done by the Ontario Agricultural College, for the simple reason that the staff are all Nature teachers, i e., they impart instruction directly from Nature, and hence are in every respect best qualified for work of this kind, great and important as it is.

The Biological Department is attempting to keep in touch with ex-students and outside experimenters by means of co-operative experiments in connection with the Experimental Union. Results of some value were secured this year both in Economic Botany and Economic Entomology. A brief statement of these results will be found in the report of the Experimental Union.

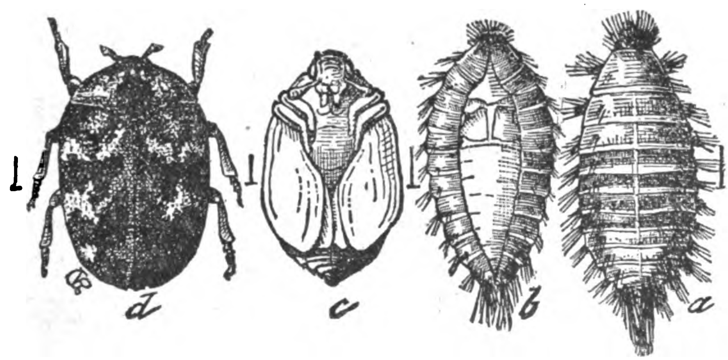
Articles Contributed to Agricultural Papers, and Papers Read at the Annual Meeting of the Entomological Society of Ontario.

At the request of the Editor, the following articles were contributed to the *Canadian Horticulturist* during the past year: "The Care of Shade Trees—I"; "The Care of Shade Trees—II"; "The Care of Shade Trees—III"; "Asparagus Beetles"; "A Peculiar Greenhouse Worm"; "Notes from the Biological Department, O. A. C." An article on "The Hessian Fly" was prepared for the *Farmers' Advocate* (August 1st).

The following papers were read at the annual meeting of the Entomological Society of Ontario, held in London, Nov. 13th and 14th: "A Plea for a Systematic and Economic Study of the Forest Insects of Ontario"; "The Silkworm Industry in Ontario"; "The Injurious Insects of the Year 1900"; "The Present Status of the San José Scale in Ontario"; and "Nature-Study Lessons on the Squash Bug."

Investigations.

The field for investigation in biological science is very large, but the time at our disposal for such work is limited to a few months in summer. April is taken up with college and fumigation work, and June is the month of excursions to the college, so the only months left us for investigation are May, July and August, out of which our holidays are also taken. I am pleased, however, to report that some valuable results have been secured in spite of the short time at our disposal.



The Buffalo Carpet Beetle. (*Anthrenus scropulariæ.* Linn.)
Fig. 1.—*a*, larva: *b*, skin of a larva; *c*, pupa; *d*. beetle. All much enlarged. (After Riley.)

The investigations carried on in this department were of three kinds: (*a*) Observations on the life histories of several known fungi and insects; (*b*) Original investigations on some previously unknown fungus or insect; and (*c*) Investigations undertaken and under way, but not completed.

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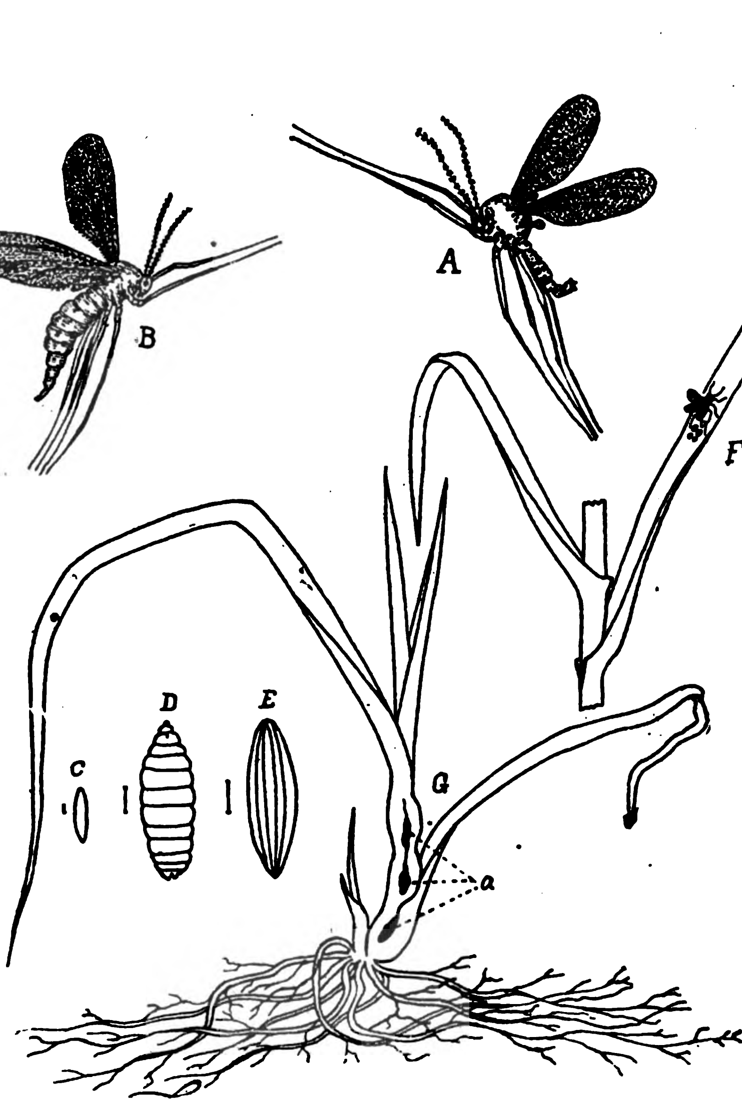
OBSERVATIONS.

1. **THE BUFFALO CARPET BEETLE** (*Anthrenus Scrophulariæ*).—For the last few years the larva, or grub, of this beetle has become a dreaded pest in houses, where it feeds on carpets and other woollen goods; it is a hairy creature, about half an inch in length when full grown, and is quite active. The beetle is not more than one-fourth of an inch long, very prettily marked with red, black and white bands or bars (Fig. 1).

These beetles pass the winter under bits of bark, etc., and in May they emerge in large numbers to feed on the blossoms of cherry and spiræa. Last spring thousands of these beetles were observed on the shrubs on the college lawn.



THE HESSIAN FLY.

FIG. 2.—A, male Hessian Fly, much enlarged; B, female, also much enlarged; C, egg; D, maggot; E, flaxseed stage; F, piece of stalk showing fly natural size, laying eggs; G, stalk of wheat injured at *a*, by the fly. The fine lines beside C, D and E show the true length of these stages, the drawings being enlarged. (Modified from Riley.)

(From Bulletin 46, Penn. Dept. of Agriculture, Harrisburg, Pa., prepared by Dr. H. T. Fernald.)

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Housekeepers, heretofore, have been content to adopt vigorous measures at the wrong time, that is, when the young grubs which have hatched from the eggs laid by the pretty beetles, are damaging the carpets. With very little trouble, the beetles may be prevented from entering rooms by the timely use of window screens,—in May when the beetles are busy on the spiræa bushes, for it is then that they fly into rooms through the open windows and deposit their eggs. The best plan to adopt when the carpets are attacked by the grub is to use gasoline along the borders of the carpets and on the floor under the borders. Vigilance for a few weeks is necessary, for the eggs are not killed by the gasoline, and grubs may appear later and do much harm.

2. THE CODLING MOTH (*Carpocapsa pomonella*).—It is very evident that the codling worm can be controlled only by the united efforts of adjoining municipalities, especially in the south-west section of the Province where there are two broods. Recent legislation permitting municipalities to enforce the *bandaging* of apple trees from the first week in June is a move in the right direction; but observations made during the summer, show that, unless united action is taken, even bandaging is of little benefit in preventing the depredations of the second brood. Moreover, if the bandages are not carefully examined every ten days or two weeks, and the hidden cocoons and lavæ killed, the whole process is actually harmful. Although codling moths are not strong flyers, yet the prevailing strong south-west winds of summer will carry them a considerable distance from the starting place. Instances of this occurred in the Niagara peninsula the past summer, so that the bandaging of trees was a failure because moths were wafted to the trees from badly infested orchards some miles distant.

3. THE HESSIAN FLY (*Cecidomyia destructor*).—Many complaints reach us regarding the prevalence of the Hessian Fly, and observations show that it is very prevalent in all the counties along Lake Erie, viz.: Essex, Kent, Elgin, Norfolk, Haldimand, Welland and Lincoln. The wheat crop of Middlesex, Lambton, Huron, Oxford and Brant have also been badly attacked, and occasional complaints have come from Perth and Simcoe. Bruce, Grey, Wellington, Waterloo, Dufferin, and the counties east of Toronto are practically free.

The long open falls of the past two years have been very favorable to the breeding of Hessian Flies. Reports of the dates of sowing of the fall wheat in the infected districts make it quite clear that the time of sowing the seed should be postponed till the last week in September. Where such late sowing has been done, the crop has escaped the fly. It is often maintained that seed sown after the first week in September does not produce a yield equal to that produced from seed sown prior to that date; but, on the other hand, it does not take many Hessian Flies to make a material reduction in the yield of an infested field.

Much may be done to lesson the damage by sowing trap strips four or five weeks earlier than the main crop to entice the flies to lay their eggs there, in which case these strips must be plowed down a good depth to kill the eggs and flies contained therein. Again, the screenings from grain injured by the fly should be burned at the time of threshing. Bushels of the insect in the "flax-seed" stage may be destroyed in this way (Fig. 2).

This department intends to make a series of experiments to determine the conditions most favorable for the sowing of the seed in the localities now so badly infested.

4. CELERY BLIGHT (*Cercospora apii*).—The celery crop of the past season has, in many parts of the Province, been seriously damaged by a fungous disease, commonly known as the "Early Leaf Blight of Celery". This disease is well known in Europe and the United States, and has done considerable damage in both countries; but it is not so well known in this Province.

Leaves affected with this disease, at first show small brownish spots, which gradually enlarge as the fungus extends itself through the soft tissues; and later these spots show a light grey centre, (Fig. 3), an appearance which is quite characteristic, enabling one to distinguish it from the "Late Leaf Blight" which shows dark pustules in the diseased portions. Fig. 3 was made from a scraping from the under side of one of the diseased leaves, placed under the microscope. The club-shaped bodies are the spores, and the thread-like filaments are the stalks to which the spores are attached. The spores are usually two to six-celled, and are readily blown to other leaves by the wind. When the conditions are favorable, the spores germinate, and the germ-tube enters the tissue of the leaf. Once within the leaf, the tube branches profusely, forming a dense network of threads,

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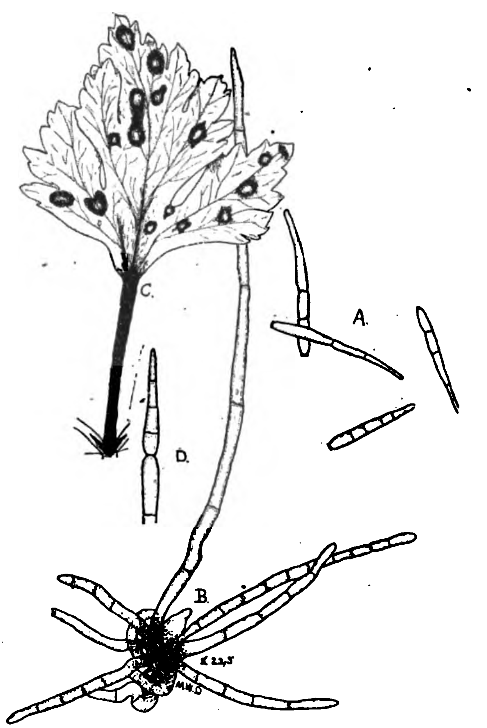
which absorb the nutriment from the soft cells of the leaf, causing their death. In this way, the brown spots are formed. Some of the branches make their way out through the breathing pores on the underside of the leaf, and produce threads and terminal spores, such as are seen in the figure.

At the College, the disease first appeared on the young plants while they were still in the cold frames; and for a time after setting out the plants made fairly vigorous growth in spite of the fact that the leaves were considerably spotted. During the month of August, however, the celery made but little growth, while the disease had spread to such an extent that it was thought the crop was completely ruined; but the cool nights of September and early October checked the progress of the disease so much, and the frequent showers invigorated the plants to such an extent that a fair crop was obtained after all.

It would appear from a study of the conditions, that intense heat accompanied by drouth is the main cause of the disease; for many plantations which were shaded and on low ground escaped the disease entirely. The rainfall in inches during the months in which celery makes most of its growth was as follows: July, 3.051; August, .87; September, 1.575; October, 3.105.

In August, the vitality of the celery was sadly impaired on account of the intense heat and severe drouth; accordingly the fungus made great headway.



CELERY BLIGHT. (*Cercospora Apii.*)

FIG. 3.—A, spores through the agency of which the disease spreads; B, tuft of aerial thread protruding through a breathing-pore of a leaf; C, a diseased leaf, showing the brown spots (Original.)

The best remedy against the blight is *the ammonia copper carbonate solution*, prepared according to the following formula:

Copper carbonate....................................	6 ounces.
Ammonia water....................................	2 pints.
Water	45 gallons.

The plants should be thoroughly sprayed at intervals of two weeks from the time they are set out until all danger is over.

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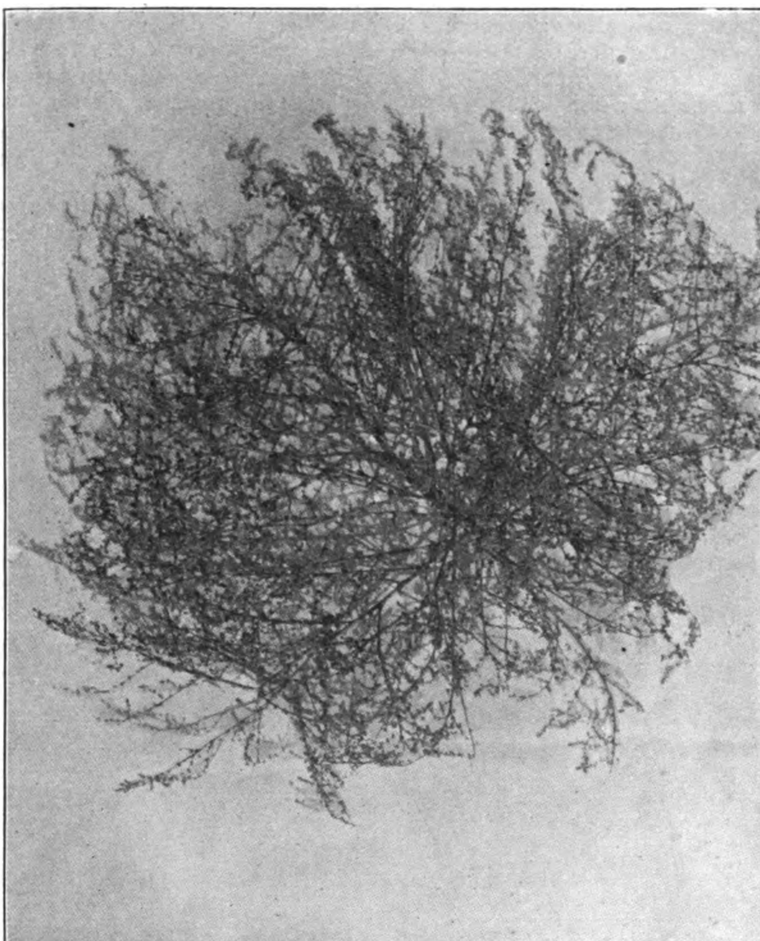
5. TUMBLE-WEED (*Amarantus albus*, Fig. 4.)—This weed possesses marked powers of distribution, and in some localities is doing much harm. Our attention was called to a farm near the College where this tumble-weed had monopolized an entire field of ten acres. Last year only a few specimens of the plant were observed. No attention was paid to them; they were not destroyed, and the result was the infestation of the whole field.

The plant resembles Russian Thistle quite closely, but can be distinguished from it by its round, shining, jet-black seeds, and by its leaves, which, although small, have a definite blade. Like the Russian Thistle, it is a low-branched plant when growing in sandy, open fields and roadside; but when the weed grows in rich alluvial or loam soil among other plants which shade it from the hot rays of the sun, its habit is entirely different. The spiny bracts are then absent, the leaves are comparatively broad, and the plant is tall and erect, with but few branches.



TUMBLE WEED.

FIG. 4.—A specimen of *Amarantus albus*, showing its close resemblance to Russian Thistle.

Remedies.—As the tumble-weed is an annual, and matures its seeds during August and early fall, the most important matter in its eradication is the prevention of seeding. The plants as a rule are conspicuous, and may be readily collected and *burned*. Special care should be taken in the purchase of grass seed; for the seeds of tumble-weed are often found in grass seed mixtures.

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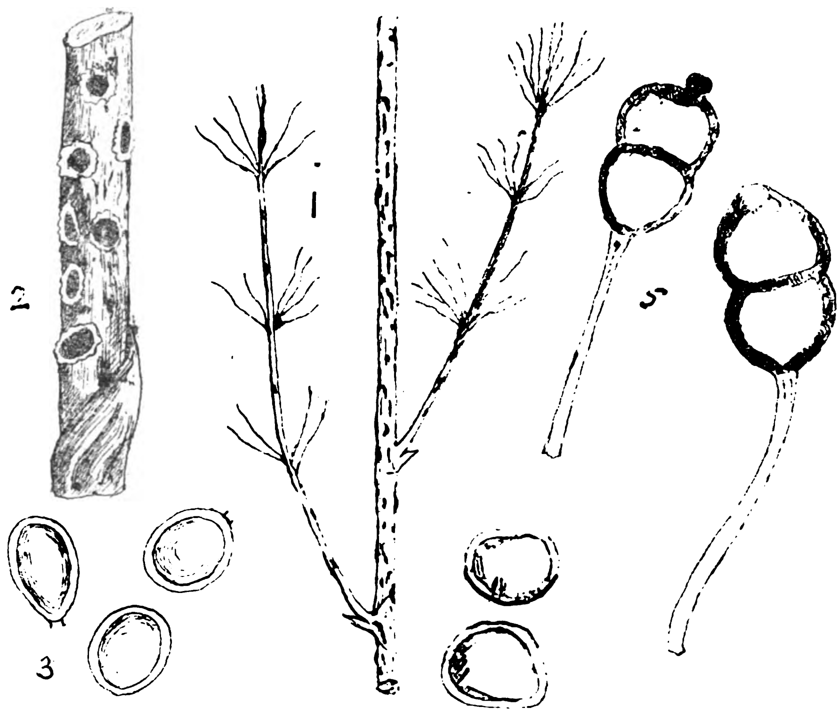
6 PIGEON WEED (*Lithospermum arvense*)—This "wheat-thief" is a very troublesome pest in fall-wheat fields, for the reason that is a winter annual like wheat itself, and ripens its seeds just a little before harvest time. From reports, it is inferred that the weed is more troublesome in the western part of the Province than elsewhere; and especially in those districts where the wheat was winter-killed. Pigeon-weed is a hairy, roughish plant with narrow leaves, not often exceeding 12 inches in height. The flowers are whitish and rather small, appearing in April. The seeds begin to ripen in May, and continue to ripen right up nearly to harvest. They are about one-tenth of an inch in length, and are hard, stony and rough. Each seed has a prominent scar at the broad, flattened end; an inner and an outer ridge running from near the base to the tip; and small smooth tubercles scattered over its surface.

Remedies—When a wheat field is badly infested; it will usually pay to plow the wheat under in spring and plant to some other crop, rather than run the risk of seeding the field with the pest. If the field is infested, it will be advisable to cultivate shallow, or harrow, immediately after the crop has been harvested; and two weeks later, cultivate or harrow again, so as to force as many of the seeds as possible to sprout. In spring put in hoed-crops into as large a portion of the field as practicable, and cultivate thoroughly throughout the season; also winter cereal crops from the rotation for some time, until the field is free from the weeds.

ORIGINAL INVESTIGATIONS.

1. THE ASPARAGUS RUST (*Puccinia asparagi*).—This fungus made its appearance in Ontario last year, so far as our observations extend, for the first time in sufficient abundance to injure asparagus plants to any considerable extent. This year, however, the disease has spread to an alarming extent. In late fall, in some sections, it was difficult to find asparagus plants that were free from the rust, while in many cases under our observation the entire plant was covered with the black rust spots.



ASPARAGUS RUST.

FIG. 5.—1, A diseased stem; 2, the cluster-cup stage on early plants; 3, spores of cluster-cup 4, spores of summer stage (uredospores); 5, spores of the winter, or telentospore stage.

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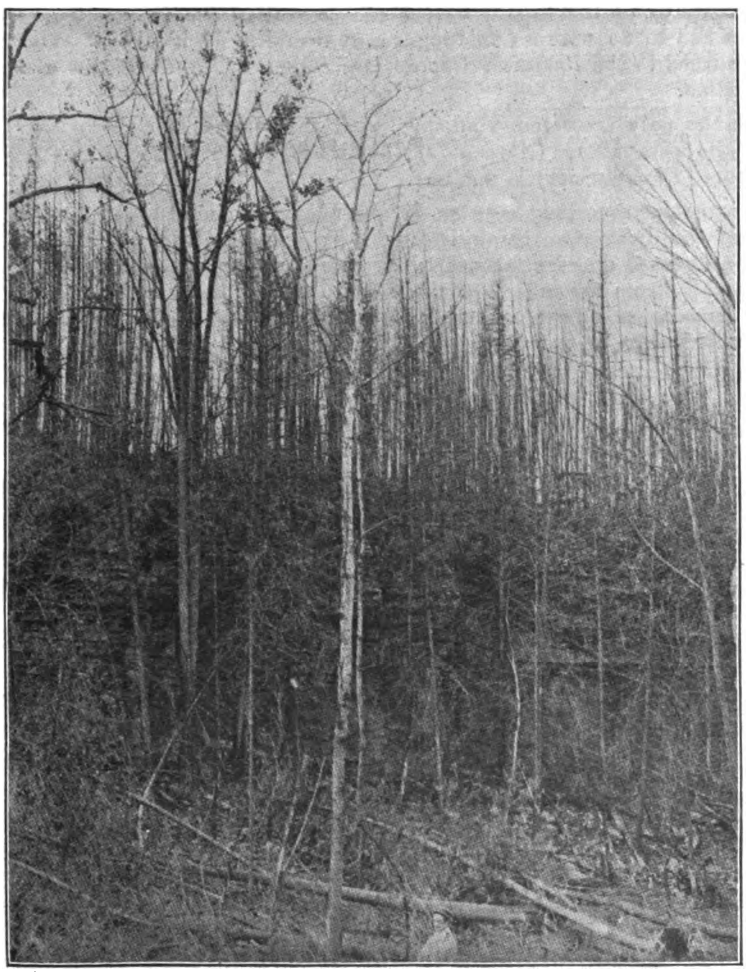
The disease is very similar to the ordinary wheat rust, and spreads by several kinds of spores. Unlike the latter, however, the asparagus rust-spores of the different kinds are borne on the same plant. The last brood of spores of the season is known as the "teleutospores," or winter spores, since these winter over on the old stalks or on the ground, and produce a diseased crop the following season. In our garden the first appearance of spores in the spring occurred on the young shoots of asparagus about the middle of May, constituting the aecidium or cluster-cup stage. These cluster cups are of a yellowish color, and are succeeded by brown pustules of the uredospore, or summer spore stage. In August, the summer spores are replaced by the spores of the teleutospore stage, which continues, as already mentioned, through the late fall and winter. (Fig. 5.) Crops badly rusted this season showed evident symptoms of lack of vitality at a time when they should be vigorous and laying up stores of food in the roots to supply the growing shoots next spring.

It is possible to combat this rust by *burning* all the wilted and diseased plants in the fall, so as not to allow any of the teleutospores to winter over and continue the crop of rust the following season. Besides this, the beds should be sprayed several times with Bordeau mixture immediately after the market season is over.



BALSAM BLIGHT.

FIG. 6.--A balsam woods near Guelph, showing a very large number of dead young trees.

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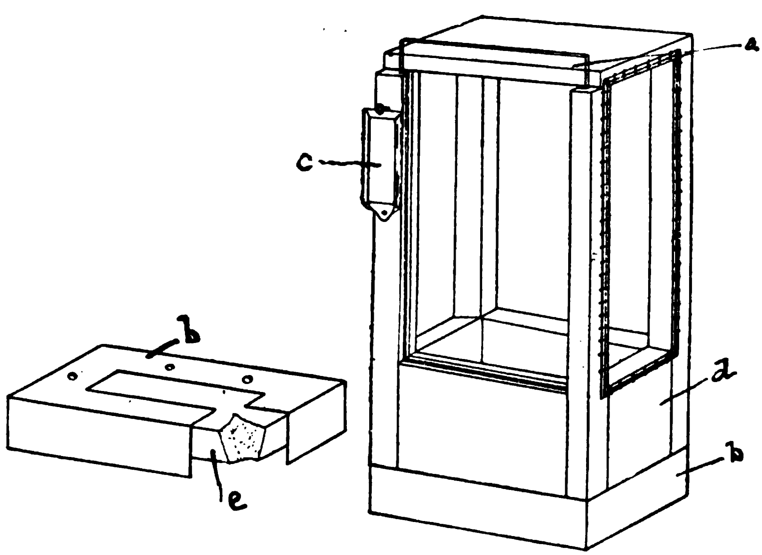
2. A NEW DISEASE OF THE BALSAMS.—During the past summer Mr. M. W. Doherty of this department devoted some time to the investigation of a serious fungous disease of our balsam trees. In a report which was prepared at my request he speaks of this disease as follows: "In the spring of 1898, while making trips to the woods and swamps about Guelph, I noticed that a great number of the balsams were beginning to present a pathological appearance. The ends of some of the branches were dead and of a reddish brown color. A quantity of this dead material was collected and examined, but no trace of any fruiting forms could be found. The following spring the investigation was taken up again as the full malignancy of the disease was now becoming apparent. Many trees had all but succumbed, and many new points of infection were noticed—in fact only a small percentage of the balsams escaped. The diseased leaves at this time showed the presence of many black wart-like tubercles, which on examination proved to be masses of spores. Like nearly all parasitic fungi, this fungus is made up of two parts, one within the tissues of the host, and the other exterior to them. The former is composed of a mass of almost colorless threads which grow between and through the cells appropriating the nourishment and thus causing their death. At frequent intervals, these threads break through the epidermis in dense fascicles, giving rise to the black wart-like spore masses.

"Pure cultures of this fungus were made on various media, and from these it was seen that we had to do with a new fungus. A technical description of this new species has been published in the *Botanical Gazette* (December, 1900) under the name *Trimmatostroma abietina*.

"So far the only trees found affected with this disease are the balsam (*Abies balsamea*), and the white spruce (*Abies alba*); but there is little reason to expect that the Norway Spruce (*Picea excelsa*) is immune.

"No preventive remedies have so far been experimented with; but judging from the nature of the disease we think it would be advisable to cut off all branches which show a diseased appearance, near the trunk of the tree, as the fungus is perennial and works usually from the ends of the branches towards the main stem In bad cases the trees should be cut down and burned. This treatment is, of course, practicable only over limited areas."



INSECT BREEDING CAGE.

FIG. 7.—*a*, sliding glass door; *b*, galvanized iron base; *c*, galvanized iron holder of note showing what is inside; *d*, wooden base; *e*, wooden bottom, detachable. (After Webster)

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INVESTIGATIONS UNDERTAKEN.—The annual loss in the Province, due to smut on oats and wheat, is very large; and farmers feel that it is necessary to treat the seed before planting so as to kill the smut spores adhering to the grain. There are two common methods of treatment in use: The *bluestone* and the *hot water* methods. Both methods are effective, but both have their defects. The hot-water treatment is cumbersome, and is liable to be carelessly done, or not done at all; while the bluestone treatment retards germination, and occasionally kills the seed. Our investigations on hand aim at determining the best percentage of bluestone solution—one which will retard germination as little as possible, and at the same time kill the fungus.

Another line of work which has been started is the determination of the causes of certain pathological appearances which were quite common the past season on the Baldwin apple, the Kieffer pear, and the tomato.

ADDITIONS TO THE EQUIPMENT OF THE DEPARTMENT.

A few additions have been made to our equipment during the past year which will aid us in doing better work in the future: A collection of 425 species of Rocky Mountain plants purchased from Mr. W. McCalla, St. Catharines; 20 insect cases of the Comstock pattern; a Leitz microscope; a photographic camera, and a rotary bookcase for the office.

In connection with our work in the study of insects, I have pleasure in reporting that twenty-four breeding cages were made in early summer by the college carpenter from models kindly presented to us by Professor Webster, entomologist of the Ohio Agricultural Experiment station. A suitable building, or "insectary" for these cages is badly needed, but provision will probably be made in connection with the new Biological building which, we hope, is soon to be erected.

The breeding cases are of two sizes, to suit the convenience of the plants upon which the insects feed. Figure 7 shows clearly the shape and structure of one of these cages. In such a cage it is possible to watch closely the development and the life history of an insect, its development, habits, &c.—in order to be better able to combat it if it happens to be an injurious form. The framework consists of four upright wooden pieces, supporting a wooden top, with a base-board three inches high. Three sides are covered with Swiss muslin drawn tightly and fastened with galvanized iron strips, while the fourth side is a pane of glass which can be raised or lowered in vertical grooves. Beneath the wooden baseboard is a lower base of galvanized iron, to which the wooden bottom is screwed. When necessary, the bottom can be removed and the cage placed over any field plant on which an insect is feeding.

These cages will be of great value, not only to the department in conducting investigations in insect life, but also to advanced students who are studying the life-histories of the more common insects.

REQUIREMENTS OF THE DEPARTMENT.

Inasmuch as investigation work is required of this department, in addition to a large amount of teaching, it is fair to assume that we ought to be provided with the apparatus and accommodation necessary for carrying on our work. I beg, therefore, to call your attention to the pressing need for:

1. More laboratory accommodation for our classes.
2. Six compound microscopes for class use.
3. A steam sterilizer, a hot-air sterilizer, and an incubator for investigation work in fungi and insects.
4. A cabinet for our collection of Fungi.
4. An insectary for the study of the life-history of insects.
6. Better museum facilities.

All of which is respectfully submitted.

W. LOCHHEAD,
Professor of Biology and Geology.

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PART V.

REPORT OF THE PROFESSOR OF CHEMISTRY.

To the President of the Ontario Agricultural College:

DEAR SIR,—It affords me much pleasure to submit herewith the annual report of my department.

The work of the year has been varied as usual, but probably more extensive, especially in sugar beet analysis, than in any other year since my appointment.

I have been especially pleased with the manner in which my classes have applied themselves to the study of chemistry, and particularly to the chemical experiments and to the analytic work.

There have been a greater number of outside requests for the analysis of miscellaneous substances than during previous years. In instances where an analysis would furnish information of value it has been made, and the results reported to those asking for the same. The requests for water analysis have been probably double those of any other year. Analyses of many samples of limestone, marls, soils, etc., have been made, but, being of no particular interest except to those requiring them, they do not appear in my report.

In an investigation to determine by a new method the composition of grain crops, research work of considerable value, bearing indirectly upon plant ash determinations, has been rather extensively pursued. Another digestion experiment, to determine the feeding value of oat dust and pea meal, has also been made; but I desire to do more work in the examination of the digestibility of these foods before attempting to state definite conclusions.

Owing to a spirited agitation of the beet sugar industry throughout the Province the Minister of Agriculture has asked me to report our sugar beet experiments separately. My report, therefore, upon this experiment is not given here in full.

RESEARCH WORK IN PLANT ASH DETERMINATIONS CONDUCTED IN CONNECTION WITH THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.

1. (a) Make by the official method (see "Methods of Analysis, 1899," p. 77) at least three crude ash determinations in sample* No. 1, using for each 12, or approximately 12, grams of the material.

(b) Determine the carbon and the carbonic acid in this crude ash, reporting on Form I, % crude ash, % carbon and carbonic acid in crude ash, and % carbon-free ash, which is the crude ash less the carbon and the carbonic acid.

2. (a) In each separate ash prepared under 1, determine the total silica (i. e., make no separation of crude silica into soluble and insoluble), reporting on Form II, crude silica in carbon-free ash.

(b) In sample marked No. 2, make three total silica determinations similar to (a) under 2, reporting results on Form II.

3. (a) Determine by the official method the % of K_2O in each sample of ash prepared under 1, reporting on Form III. % K_2O in carbon-free ash.

(b) In sample 2, make three K O determinations similar to (a) under 3, reporting results on Form III.

NOTES.

1. In each determination, (a) and (b) of 2, not less than one gram of the ash is to be used, and the filtrates from these may be employed, respectively, for (a) and (b) under 3.
2. To determine carbonic acid, see 6 on page 79 of "Methods of Analysis", 1898.
3. In (a) and (b) of 2, collect in a tared Gooch, and dry to constant weight at 110° C. After incineration the loss in weight gives the carbon.

*Oat Straw is finely ground.

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RESULTS REPORTED.—Owing chiefly, I suppose, to pressure of work, only three of those to whom samples were sent reported results. These are Dr. G. S. Fraps, Assistant Chemist, North Carolina College of Agriculture and Mechanic Arts, Raleigh, N.C.; Mr. C. C. Moore, of the United States Department of Agriculture, Division of Chemistry, Washington, D.C.; and W. P. Gamble, B.S.A., Special Assistant, in the Department of Chemistry, Ontario Agricultural College, Guelph, Canada. To these gentlemen we are much indebted for the valuable results obtained in the following tables :—

TABLE I.—*Carbon free Ash in Sample No. 1.*

Analysts.	Determinations.	Per cent. in Water-Free Substance.			
		Official Method.		New Method.	
		Single Determination.	Average.	Single Determination.	Average.
Moore, C. C.	1	6.25	6.25		
do	2	6.25			
Fraps, G. S.	1	5.56	5.55		
do	2	5.59			
do	3	5.49			
Gamble, W. P.	1	6.40	5 87		
do	2	5.01			
do	3	6.20			
do	4	5.66	5 655		
do	5	5.65			
do	6			6.38	6.38
do	7			6 39	
do	8			6.36	

Crude ash of vegetable and animal substances, ever so carefully burned, contains varying quantities of carbonic acid, carbon, and foreign matter. Therefore, percentages determined and stated as crude ash may vary as much as .2 to 2 per cent. in the same substance. Because of this, I think chemists should make carbonic acid and carbon determination in the crude ash, and state percentages as carbon-free ash. Even with the greatest care, employing the official method for the preparation of the ash, a lower percentage of carbon-free ash will be obtained than that actually contained in the substance, owing to losses of chlorides, and probably more or less phosphorus and sulphur by volatilization. Of the correctness of this fact, I am convinced by investigations which have been made by me, and published in my inaugural dissertation under the title "Eine neue Methode der Aschenbestimmung." This fact is also confirmed, as shown in Table I., by the work of Messrs. Moore, Fraps, and Gamble. The average percentage of carbon-free ash determined in sample 1, by what I have called a new method, is from .13 to .83 of a percentage higher than the averages determined in the same sample by the official method. Why should the individual percentages of carbon-free ash in the same substance and determined by the same chemist with undoubted care vary all the way from 5.01 to 6.4 per cent.? Again, why should the averages of carbon-free ash, determined in the one substance by different chemists working with equal care, vary from 5.55 to 6.25 per cent.? These variations, I believe, are due to volatilization of varying quantities of certain ash constituents. By the new method, which employs a closed platinum apparatus and calcium acetate solution, individual determinations of percentages of carbon-free ash in the same substance are concordant to the first decimal, as shown by determinations 6, 7, and 8 in Table I.

Heat employed in the reduction of substances to ash very readily causes more or less fusion whereby the bases of the ash enter into chemical combination with the silica, forming a product or products which resist the action of hydrochloric acid, and are therefore collected and weighed in ash analysis as silica. These circumstances may and do frequently result in very erroneous silica determinations. Take for example Mr. Gamble's second determination, 26.72 per cent., Table II., as compared with the other determina-

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tions of crude silica. It is 10.64 per cent. greater than the next highest. The difference, I am confident, is not due to errors in work, but to fusion with the formation of products undecomposable in hydrochloric acid. In preparing the ash (Table I., 2, Gamble) from which this silica was separated, the heat rose a little above dull redness which immediately caused distinct fushion in the ash.

TABLE II.—*Crude Silica in Carbon-free Ash.*

Analysts.	Determination.	Per cent. in Ash from Sample 1.		Per cent. in Sample 2.	
		Single Determination.	Average.	Single Determination.	Average.
Moore, C. C.	1	14.13	14.125	15.27	15.23
do	2	14.12		15.19	
Fraps, G. S.	1	15 81		15.44	
do	2	15.89	15.84	15 33	15.56
do	3	15.82		15.91	
Gamble, W. P.	1	15.93		15.50	
do	2	26.72	19 58	15 34	15.39
do	3	16.08		15.35	
do	4	15.85	15.45		
do	5	15.54			
do	6			15.24	
do	7			15.23	15.22
do	8			15.19	

Sample No. 2 is an ash prepared by the use of the calcium acetate solution in my closed platinum apparatus. The use of calcium acetate solution in moistening the substance before reducing it to ash appears to prevent the formation of any trace of undecomposable products in the ash. Consequently, it was expected, not only that the individual determinations of crude silica in sample No. 2 would be more uniform, but that the average percentage would be lower, than in the ash prepared from sample No. 1 by the official method. With the exception that one chemist found more silica in sample No. 2 than in the ash of sample No. 1, the figures of Table II. justify the above expectations.

TABLE III.—*K_2O in Carbon-free Ash*

Analysts.	Determinations.	Per cent. in Ash from Sample No. 1.		Per cent. in Sample No. 2.	
		Single Determination.	Average.	Single Determination.	Average.
Moore, C. C.	1	28.27	28.19	30.87	30.96
do	2	28.10		31.05	
Fraps, G. S.	1	32.46			
do	2	32.85	32.51	32.09	
do	3	32.22			
Gamble, W. P.	1	31.59		32.19	
do	2	27.72	29.57	32.27	32.25
do	3	29.41		32.29	
do	4	31.21	31.09		
do	5	30.96			
do	6			32.75	
do	7			32.87	32.86
do	8			32.96	

Fusion, in the preparation of ash forms undecomposable products, therefore, lower percentages of potash might be expected to accompany higher percentages of silica. That this is the case in a number of instances, the figures in tables II. and III. show. In

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addition to this tendency of fusion to lower the percentages of potash, volatilization of chlorides in the preparation of an ash acts in the same way. These two circumstances account for the higher percentages of potash in sample two than in the ash of sample one. This tendency of fusion and volatilization to lower the percentage of potash, Gamble's determination 2 makes very evident. That a somewhat higher temperature than that of dull redness was allowed in preparing that ash and that more or less fusion occurred in the ash are facts known to me. Table I. shows that Gamble's determination 2 is the lowest percentage of carbon free ash. Table II. shows that it is the highest percentage of crude silica, and Table III. that it is the lowest percentage of K_2O.

All chemists will agree with me that the place to begin improving the method of ash analysis is in the preparation of the ash. I am of the opinion that volatilization and fusion in its preparation are two important sources of error, that the use of calcium acetate overcomes the difficulty of fusion, and that the use of a closed platinum apparatus prevents volatilization.

Sugar Beet Experiment.

The Beet Sugar industry has been before the people of Ontario for a number of years, during which time sugar beets in small patches have been grown in probably every county of the earlier settled portions of the Province. Seed has been received by our farmers either from seed stores, or from capitalists, or others interested in the establishment of the beet sugar industry in Ontario. It has been planted and the crop cultivated much as farmers commonly plant and cultivate root crops grown to feed stock. Numerous samples containing from one to five roots each have been forwarded to our chemical laboratory and analyzed, the results of which have been published from time to time in our annual reports. In the years 1889, 1890, 1891, 1897 and 1899, respectively, twenty-six, one hundred and seventeen, thirty-two, forty and eighty-nine samples of sugar beets were received and analysed, out of which only three, sixty-eight, twenty, twenty-five and thirty samples, respectively, contained 12% or over of sugar in beet and a co-efficient of eighty in purity; or, in other words, the quality of 158 samples out of 304, or practically 52%, was below the standard for factory purposes. These inferior results were due entirely to a lack of knowledge on the farmers' part of the conditions of planting, manuring, cultivation, etc., needful to produce both quality and yield of beet.

The object of the sugar beet experiments conducted this year is (1) to ascertain the quality and the yield of beets that may be obtained from our soil under proper conditions of planting, manuring, cultivation, etc., and (2) to give object lessons in growing sugar beets for factory purposes. My report shows beyond a shadow of doubt that the soil and climate of large portions of Ontario are admirably adapted to the growth of sugar beets of high quality and heavy tonnage.

It was in response to numerous and pressing requests that the Hon. John Dryden, Minister of Agriculture, decided to direct that these experiments be conducted. Among the requests was one worthy of special mention. I refer to that of the Canadian Sugar Syndicate, Limited, of Glasgow, Scotland, by whom, through their Secretary, Mr. Wm. James Stewart, proposals were made to furnish free, 4 lbs. of beet seed to every one of fifty farmers in the neighborhood of Aylmer, Elgin Co., and to every one of fifty others in the vicinity of the town of Welland; and to offer in each place six prizes of $30, $25 $20, $15, $10 and $5, on conditions that the parties receiving the seed should plant the same upon one-quarter of an acre, and cultivate the crop under the direction of the Ontario Agricultural College. Further, the Syndicate proposed to give $240 towards payment for inspection of the beet plots during the seeding and growing season.

The people about Newmarket, York Co., also made application to the Government to have a sugar beet experiment conducted in their section. No other places making application, our sugar beet experiments were confined to the above three neighborhoods, viz., Newmarket, Aylmer and Welland.

A bulletin entitled, "The Cultivation of Sugar Beets," was prepared at the request of the Minister and distributed by the Department to the experimenters in Elgin, Welland and York Counties. It gave full instructions on the preparation of the soil, the sowing of the seed and the cultivation of the growing crop. Copies of this bulletin may be had on application to the Department at Toronto.

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Upon April 26th, I addressed a meeting of the farmers at Aylmer, to whom seed was promised, on the subject of the cultivation of sugar beets, at the close of which the seed in 4 lb. packages, was distributed. During the following five days every plot was inspected by a competent person to see that each plot selected was suitable and properly prepared, and that the seed was planted at the time and in the manner prescribed.

On April 28th I addressed a similar meeting in Welland on the same subject, and afterwards distributed the seed, inspected plots, etc., as at Aylmer.

In compliance with a request from the farmers about Newmarket for a sugar beet experiment, the local member for North York, the Hon. E. J. Davis, Minister of Crown Lands, arranged for a public meeting of the farmers of that riding, to be held in the town of Newmarket at two o'clock, on Wednesday, May the 9th. This meeting, called at the request of the people for the purpose of arranging for a sugar beet experiment, was attended by a large body of representative farmers, many of whom, after a full discussion of the subject, volunteered to plant sugar beet seed.

Seed, which is known as the Mangold Sugar Beet Seed, imported from Germany, was immediately distributed in two or four pound lots, among forty-five farmers, whose plots were inspected and who received copies of the bulletin which was sent to those at Aylmer and Welland.

Commencing in Aylmer on May 30th, between this date and June 3rd, we inspected every plot of beet plants which were ready to thin, to insure proper cultivation and thinning at the right time.

A third inspection of every patch in the above places was made between August 22nd and September 7th, a time when the ground should be well hidden by the expanded and interlacing leaves, which were then beginning to turn faintly yellow.

Collecting Samples and Estimating Yield.—Five men at Aylmer, five at Welland, and four at Newmarket, all of whom had beet plots and were favorably situated, so that the entire number of plots could be reached in one day, were appointed Assistant Inspectors, to collect samples and superintend the pulling of the beets in order to estimate yield.

On Sept. 20th, Oct. 4th and 18th and Nov. 1st and 15th, samples from all the patches at Aylmer and Welland were collected by the inspectors and forwarded to Guelph for examination and analysis. The four local inspectors at Newmarket were notified to collect and forward samples to Guelph on Sept. 25th, Oct. 9th and 23rd, and November 6th. On the day of the arrival of the beets at the College, they were brushed, weighed, topped, etc., and then analysed.

Percentage of Sugar and Co-efficient of Purity in the Juice.

Every beet of a tared sample was cut as equally as possible into two or four parts, and one of the half or quarter sections of every beet was taken to make up the sample for analysis. This sample taken for analysis was run through the hand grating machine. which reduced the sample to a pulp resembling grated horse-radish. The whole of this pulp, carefully folded in a strong cotton cloth, was placed in the lever press and squeezed, till the juice was all pressed out into a tin quart measure, where it was allowed to stand about twenty minutes to settle. Enough juice was then poured from the measure into a tin cylinder to fill it. The foam collecting on the top of the juice in the cylinder being removed, a Brix hydrometer was then lowered into and allowed to float in the juice for several minutes.

One hundred pounds of sugar beets contains an average of 95 lbs. of juice, and one hundred pounds of average beet juice contains about 15 lbs. of solids, which solids may be composed of, say, 12 lbs. of sugar and 3 lbs. of matter not sugar. This matter not sugar is largely mineral, which is a great hindrance, causing serious losses of sugar during the manufacture. Every pound of this matter not sugar keeps practically one pound of sugar from crystallizing. The crowns of sugar beets, leaf stems, large beets, beets grown on soils rich in vegetable matter, fertilized with barnyard manure, or reclaimed by drainage from swamps, and immature beets, contain a large amount of this matter. Consequently, such beets and portions of beets yield juice that is not only unsatisfactory, but very unprofitable to a sugar manufacturer.

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When the Brix, lowered into the juice contained in the cylinder, came to rest and the temperature became constant, the graduation was read, which reading is called Brix and represents the total solids in the juice.

A normal weight (26.048 grams.) of this juice was then accurately weighed and carefully washed into a 100 c.c. flask. It was then clarified with lead acetate; and the flask containing it was filled with water to the 100 c. c. mark.

Examples—

1 $\dfrac{\text{Per cent. sugar in juice, 14 5}}{\text{Brix, or total solids in juice, 16.1}}$ x 100=Purity, 90.1.

2. $\dfrac{\text{Per cent. sugar in juice, 8.9}}{\text{Brix, or total solids in juice, 11 7}}$ x 100=Purity, 76.1

The beets of Example 1, cultivated on the flat, in rows 21 inches apart, averaged a net weight of 1 lb. 15.4 oz. and yielded a net weight of 22 tons, 1,166 lbs. per acre; while the beets of Example 2, cultivated on raised drills, thirty inches apart, averaged a net weight of 1 lb. 9.6 ozs., and yielded a net weight of 22 tons, 500 lbs. per acre.

Upon the assumption that each pound of matter not sugar in the solids of beet juice keeps at least one pound of sugar from crystallizing, 88.9 per cent. of the sugar in the beets of Example 1, but only 68.5 per cent. of the sugar in the beets of Example 2, would crystallize. This enormous loss of sugar which would occur in the latter case will not occur when farmers fully understand and practice proper methods of cultivation. The beets of Example 2 were grown in excellent sugar beet soil, but were cultivated as if intended for feeding and exhibition purposes: while those of Example 1 were cultivated strictly according to the printed directions sent to guide growers in these experiments.

Of the fifty-two Aylmer farmers to whom seed was given, forty-seven succeeded with the crop and five failed by neglecting thinning and cultivating. The fact that 90 per cent. of the plots planted yielded crops, and that the few failures were due chiefly to neglect, makes it clear that the sugar beet crop is, at least, as certain as any other crop we produce. It is extremely important, however, to have a properly prepared seed bed, and to plant only the earliest maturing and the best variety of seed.

Much the larger number at Aylmer planted early, between April 28th and May 5th; several planted later, one as late as May 18th, another even as late as June 7th; and two reseeded, one on the 2nd and the other on the 4th of June. The two reseeded plots and the one planted on June 7th, yielded crops much lighter than the average.

Three of the plots were not planted strictly as required for factory purposes. The beets of one plot in particular were grown too far apart, and consequently grew large, yielded less per acre, and were inferior in quality. The beet juice of these three averaged only 11.1 per cent. sugar and 75.3 per cent. purity; while that of the forty-four plots of beets grown as the factories require, averaged 14.4 per cent. sugar and 86.1 purity. Considering the farmers' inexperience in growing factory sugar beets, and their long practised methods of growing fodder roots, which methods produce inferior and unprofitable sugar beets, Aylmer has reason to be proud of the above results.

Averages of all samples.

Aylmer.

Dates of Pulling Samples.	Clean Beets.	Analysis of Juice.	
	ozs.	Sugar.	Purity.
		%	
September 20th	16.4	14.8	84.2
October 4th	17.4	13.9	83.5
October 18th	17.9	14.4	85.9
November 1st	18.6	14.2	86.5
November 15th	20 8	13.9	86 8

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The difficulty of handling the beets in cold, frosty weather has been advanced as an argument against the beet sugar industry in Ontario; but the results of our experiments show that the average per cent. of sugar was higher on September 20th than on any other date of pulling. Purity was also high on September 20th, and steadily improved through the season. These facts appear to indicate the probability that our bright warm summer weather, and cool autumn nights, mature sugar beets early, making it possible and also advisable, should factories be established, to begin delivering the crop early in September, in which case the entire crop could be lifted in good weather.

To obtain the best results in sugar beet cultivation for factory purposes, there must be regular, rapid growth during the summer months, with maturity of beets at the time of lifting, which requires warm, showery weather, particularly in early summer, and fair weather with cool nights in autumn. Such weather conditions did not prevail in the Aylmer district last summer; but, on the contrary, May, June and July were very dry months; and though the early part of September was fair, warm showery weather prevailed from September 20th till after the last samples were lifted on November 15th. It cannot, therefore, be said that the excellent results of the Aylmer sugar beet experiment are due to a specially favourable season.

Owing to favorable seeding weather and to lack of farm help, the previously mentioned meeting at Welland on the 28th April was attended by only a few farmers. Many who had intended taking sugar beet seed, being hard pressed with regular farm work, changed their minds. I found it necessary, therefore, to seek other farmers who would accept and plant the seed which was not taken by those whose names were on the list of applicants, but who for one reason or another had decided not to plant. These changes in the placement of the seed operated to the disadvantage of the Welland Experiment. The directions for cultivation not having been carefully followed by a few, several unnecessary failures occurred. Fifteen out of fifty-two who received seed, did not obtain crops, owing, in some instances, to not planting, in others to a wrongly prepared seed-bed, and in others to drying and crusting of the surface soil. Five of the list of thirty-seven who planted and obtained crops, did not strictly observe directions for cultivation to produce factory beets, which to be profitable to the manufacturer, and therefore to the farmer, must have average or more than average quality. The average for the whole season of the beet juice of those five beet patches is only 11.5 per cent sugar and 77.3 per cent. purity; while that for the whole season of the beet juice of the thirty-two properly cultivated patches is 14.7 per cent. sugar and 85.4 purity.

WELLAND.

Date of Pulling Samples.	Clean Beets.	Analysis of Juice.	
	ozs.	Sugar.	Purity.
		%	
September 20th	15.7	15.1	82 5
October 4th	16 0	13.7	82.8
October 18th	19.9	14.2	85.9
November 1st	16.5	14.3	85.4
November 15th	17.2	14.4	84.9

It is also true of beets grown in Welland Experiment, as the above averages show, that the first samples, collected on September 20th, averaged the highest in sugar. The numbers showing average weight of clean beets indicate very little increase in size from September 20th, till November 15th. That Welland beets are a little small is not, when understood, a discouraging feature. In answer to the question, "Were rainfall and growth average in your district this past summer?" Mr. John H. Hemmings, assistant inspector in the sugar beet experiment at Welland, writes, "No. We had the driest season I ever experienced in this country in eighteen years." He further adds, "I think it will be little trouble in a fair season to grow eighteen to twenty tons per acre. I have 170 big bushels on the quarter acre, and very nice roots. In fact I am very

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much pleased with them, and all those who have grown them will, I am satisfied, do so again on a larger scale." The four other assistant-inspectors in the Welland experiment answered the above question regarding rainfall and growth to the same effect, viz, that the early summer was extremely dry. That the results in both yield and quality of beets in the Welland experiment were obtained under such adverse conditions as the above is valuable evidence as to the adaptability of the district to sugar beet cultivation.

In Newmarket Experiment, seed was given to forty-five farmers, practically all of whom closely followed the directions for cultivation and succeeded with the crop. That such is the case is very creditable to the farmers in the Newmarket district, for the reason that previous to the day of the initial meeting, May 9th, few, if any, had given any thought to the subject.

That the soil of the Newmarket district will yield beets of a uniformly high quality is evident from the above results.

NEWMARKET.

Dates of Pulling Samples.	Clean Beets.	Analysis of Juice.	
	ozs.	Sugar.	Purity.
		%	
September 25th	17.3	15 3	81.9
October 9th	17.7	14.7	83.1
October 23rd	19.6	14.2	84 0
November 6th	19.7	15 0	84.1

As in the former experiments, viz., those at Aylmer and Welland, the above averages show that the beets were richest in sugar on the first date of collecting samples, viz., September 25th, and that there was very little increase in the size of beets between that date and November 6th. Purity, however, though always high, gradually improved. It is quite possible, as at Aylmer and Welland, that the delivery of the crop at a factory could be profitably commenced early in September, owing to the favorable influences of our climate in maturing sugar beets at an early date.

CONCLUSION.—The results in yield, in quality, and in cost of cultivation of sugar beets, show clearly that Ontario farmers, in certain extensive districts of the Province, can realize comparatively large profits by growing sugar beets at the prices paid for them by American Beet Sugar factories. Undoubtedly the beet sugar industry once established in Ontario will prosper. Our soils are, for the most part quite suitable to the cultivation of sugar beets; the warmth and bright sunshine of our early summer are favorable to the production of size of root and sugar, while the bright days and cool nights of Autumn insure, at an early date, a high degree of maturity. We have in our Province an abundance of water and, in many places, extensive limestone deposits. Ontario farmers, through the helpful instruction of the Ontario Agricultural College, the meetings of the Farmers' Institutes, the Live Stock, the Dairymen's and the Fruit Growers' Associations, etc, have attained a well deserved and world-wide reputation for high quality of their exported agricultural products. Farmers, who by their intelligence, close observations, industry and application of the most skilful methods, have won this reputation, can be depended upon to apply these same qualities in the development of what promises to be in this Province one of our most important industries.

BEET PULP.

The quantities of digestible matter in one hundred pounds of beet pulp and corn ensilage have been determined by the California Experiment Station as follows:

	Beet pulp.	Corn ensilage.
Protein	1.3	1.4
Fat	0.4	0.6
Carbohydrates (sugar, starches, etc)	4.2	5.6
Fibre	2.5	6.5

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Mr. C. G. Miller, a thoroughly practical and successful farmer, near Cairo in Michigan, told me, when I inspected his sugar beet field in August last, that he has quit growing other roots for feed, because he finds that beet pulp fully supplies the place of roots for feeding.

Does beet pulp possess feeding value? is not a question in my mind at all. Sugar beets, like other roots, are highly digestible, and have, in combination with other fodders, an intrinsic value beyond their apparent value as determined by analysis. Treatment with hot water to remove the greater part of the sugar, does not injure the nutritive value of the remaining portion of the beet called "beet pulp."

A special report containing the details of these experiments has been issued, and may be had on application to the Department of Agriculture at Toronto. It contains also two reports of commissioners sent to Michigan by the Minister to investigate the growing of sugar beets in that State.

Soap Analysis.

Replying to a request contained in the following letter, we analysed two samples of soap, numbered 632 and 876, but regarding which we received no particulars:

FREEMAN, Sept. 5th, 1900.

DEAR SIR,—I herewith send you samples of soap. Since the receipt of your letter, I have not found time to attend to this till now.

When you have determined the contents of these soaps, I will be glad if you will send me a statement promptly.

Yours, etc.,

GEO. E. FISHER.

Analyses of soaps.	Soap No. 632. Per cent.	Soap No. 876. Per cent.
1. Moisture	53.86	43.53
2. Combined fatty acids	39.13	36.59
3. Alkali as K O and Na O in combination with fatty acids	5.57	6.32
4. Free potash and soda as K O and Na O	.54	None.
5. Unsaponified fat and free fatty acids	10.41	12.21
6. Alkali K O and Na O as carbonate	1.31	.61
7. Carbonate as C O	.41	.25
8. Insoluble residue	.10	.49

The total alkali present in sample 632 is 7.42 per cent., composed of K_2O, 5.09 per cent, and Na_2O, 2.33 per cent.

Total alkali present in sample 876 is 6.93 per cent., composed of K_2O, 4.23 per cent., and Na_2O, 2.70 per cent.

Hamilton Sludge.

In April last the following letter was received, through the Department of Agriculture, from Mr. E. G. Barrow, O.L.S., of Hamilton:

HAMILTON, Ont., April 17th, 1900.

DEAR SIR,—A great many farmers and fruit growers in the vicinity of Hamilton are anxious to know whether the sludge obtained from our Sewage Disposal Works would be of value as manure.

The chairman of our Sewer Committee desired me to write you, and ask if you would allow your Government Analyst to examine it and make a report as to its value for agricultural purposes.

We would send a couple of barrels to the College at Guelph for the purpose.

I would be pleased to have an early answer.

I am, yours very truly,

E. G. BARROW,
Manager.

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Receiving word that an examination of the sludge would be made, Mr. Barrow sent a barrel to the College about May 20th.

The material, which appeared like a hardened lump of earth, was sampled and analysed, the results of which are given below in comparison with the composition of average farmyard manure :

ANALYSES OF SLUDGE AND FARMYARD MANURE.

Kind.	Percentage Composition of Fresh Material.				Percentage Composition of Dry Matter.		
	Moisture.	Nitrogen. N.	Phosphoric Acid. P O.	Potash. K O.	Nitrogen. N.	Phosphoric Acid. P O.	Potash. K O.
Sludge	47.86	.525	.380	.097	.998	.721	.185
Farmyard Manure	65.0	.4 to .6	.2 to .4	.4 to 7	....	....	....

The above analyses show that the sludge contains manurial constituents ; that there are practically as high percentages of nitrogen and phosphoric acid in it as in farmyard manure ; but considerably less potash. I am quite sure that this sludge, if dried and ground and applied in sufficient quantities, would be beneficial to certain crops, as corn. wheat, barley, etc. Applied to land in the form of mud or in the form of hardened lumps, it might possibly be a physical injury to the soil.

Through the kindness of Mr. C. A Zavitz, Experimentalist, a practical test was made by applying the sludge in a dried and powdered condition to meadow land. The following is Mr. Zavitz's report :

REPORT ON AN EXPERIMENT TO TEST THE VALUE ON GRASS LAND OF A SLUDGE RECEIVED FROM HAMILTON IN THE SPRING OF 1900.

A barrel of sludge came from the city of Hamilton in the spring of 1900, and was opened about the 25th of May. As the sludge was in the form of tough chunks still containing a considerable amount of moisture, it was found necessary to place these chunks in the sunshine, and then to pound them into small particles as soon as they became sufficiently dried. The material was thus converted into a more suitable form for applying to the land, as part of it was made into a powder, leaving the largest pieces not much larger than common field peas. After examining a field of timothy which had produced one crop of hay in 1899, and which was to be left for hay in 1900, a portion was selected for testing the sludge, and this was measured into plots of equal size and shape with a path three feet wide between the plots. Each plot was one-fortieth of an acre in size.

The experiment was started on the 28th of May, at which time the timothy plants were about six inches in height. One plot received dry sludge at the rate of one thousand pounds per acre and another plot received no sludge whatever. There were light rains on May 29th, 30th and 31st, and there was a heavy rain on June 2nd.

On July 23rd, the timothy on each plot was cut and weighed in the green condition immediately after it was cut. The weighing was done in the field beside the plots by means of a platform scale which is used for such work. The plot which received no sludge yielded at the rate of twelve thousand two hundred and eighty (12,280) pounds of green timothy per acre, and the plot which received the sludge yielded at the rate of twelve thousand eight hundred (12,800) pounds per acre. It appears, therefore, that the air dried sludge which was applied at the rate of one thousand (1,000) pounds per acre increased the yield of green timothy at the rate of five hundred and twenty (520) pounds per acre, or a little over four (4) per cent. Had there been a sufficient amount of the sludge to make the test in duplicate, the results would have been of greater value.

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Digestion of Oat and Pea Bran by Sheep.

A number of inquiries having been received regarding the feeding value of oat dust and pea bran, I decided to have a digestion experiment conducted to obtain information in reference to the feeding value of the above foods.

For this experiment, I obtained early in the spring, five bags of oat dust from the Flavelle Milling Co., of Lindsay, The Tillson Co., of Tilsonburg, and five bags of pea bran from Walter Thompson, Mitchell. The Tillson Company write: "We are selling at the mill oat dust at $7 per ton, and pea bran at $13 per ton; the local demand is taking all we can produce." The Flavelle Company write: "We sell a large quantity of this oat dust to the farming community in our county. We sell it for about two-thirds the value of bran. At present we are getting $10 per ton in bulk for same. We shall be exceedingly glad if you can give us any information in reference to its analysis and how it will compare with bran for feeding purposes." Mr. Walter Thompson, Mitchell, writes, "We should appreciate a special report, giving percentages of the composition, especially protein and fat, and also your estimate as to the feeding value of these feeds. Last year we sold to farmers 417 tons oat dust at average of $7.00 per ton, and 56 tons pea bran at an average of $12.00 per ton. If a practical test is made we shall appreciate a statement regarding the results."

Three thrifty yearling wethers being selected for the experiment were fed Flavelle oat dust and a little cut hay from April 6th to 12th inclusive; then oat dust alone till April 20th. Commencing at 5.30 p.m. on the 20th the solid excrement was carefully collected between then and 5.30 p.m. on the 25th April. They had free access to water and salt. On April 6th their weights were as follows:—No. 1, 106 lbs.; No. 2, 110 lbs., and No. 3, 106 lbs.; and on April 25th they weighed respectively 103 lbs., 108 lbs. and 104 lbs., all having lost a few pounds.

The sheep were again given cut hay with Tillson Company's oat dust, which feed they received for six days, after which the hay was discontinued and the oat dust alone continued for seven days. At the close of this second preparatory period, on May the 8th, the solid excrement was again carefully collected from 5 30 p.m. of May 8th till 5.30 p.m. of May 13th. They were again weighed on May 13th, but had neither gained nor lost weight.

During these two periods on oat dust the animals ate heartily, and were given 300 grams each three times daily.

The three animals were at once given Tillson Company's pea meal, but no cut hay, as was the case the first several days when fed oat dust. The solid excrement was collected from 5 30 p.m. of the 20th May till 5.30 p.m. of the 25th May. Sheep No. 2, refusing to eat, was dropped out of the experiment and put for a time on other feed. Sheep No. 3 continued hearty, but sheep No. 1 toward the end of this third period scoured a little. During these twelve days, while fed on Tillson Company's pea meal, sheep No. 1 gained two pounds, and sheep No. 3 gained three pounds.

Immediately, all three sheep were given Thomson's pea meal; and at the end of the seventh day, from 5.30 p.m. on June 2nd till 5.30 p.m. on June 7th, the solid excrement was carefully collected. During the twelve days when fed on Thomson's pea meal, sheep No. 1 gained four pounds; sheep No. 2, four pounds; and sheep No. 3, one pound.

During the two periods on pea bran, the animals, with the exception of sheep No. 2 as above noted, ate heartily, and were given 300 grams each three times a day.

Analysis of Oat Dust and Pea Bran.

Name.	Moisture. Per cent.	Nitrogenous matter. Per cent.	Alb. Per cent.	Fat. Per cent.	Crude fat. Per cent.	Soluble carbo-hydrates. Per cent.	Ash. Per cent.
Flavelle oat dust.......	6.685	9.781	8.656	5.735	18.160	55.131	4.508
Tillson Co's. oat dust..	7.17	10.969	10.625	5.53	22.602	47.494	6.235
Tillson Co's. pea bran..	7.60	9.562	9.372	2.99	49.105	27.858	2.885
Thomson's pea bran....	7.937	12.00	11.25	.550	54.356	22.281	2.876

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Digestibility of Flavelle Oat Dust.

Lindsay Oat Dust.	Organic.	Nitrogenous substances.	Alb.	Fat.	Crude fibre.	Soluble carbo-hydrates.
Sheep No. 1:						
Amount fed	2799.45	293.43	259.68	172.05	544.80	1653.93
" excreted.......	838.02	86.20	....	33.71	310.55	354.11
" digested........	1961.43	207.23	....	138.34	234.25	1299.82
Digestion co-efficient....	70.07	70.62	.. ..	80.40	43.00	78.59
Sheep No. 2:						
Amount fed	2799.45	293.43	259.68	172.05	544 80	1653.93
" excreted........	1142.52	106.61	....	45.21	452.60	455.22
" digested........	1659.93	186.82	....	126.84	92.20	1198.71
Dig. co-efficient.........	59.19	63.66	... .	73.72	16.92	72.47
Sheep No. 3:						
Amount fed	2239.56	234.74	207.74	137.64	435.84	1323.14
" excreted........	765.77	84.84	....	35.13	271.59	302.25
" digested........	1473 79	149.90	....	102.51	164.25	1020.89
Dig. co-efficient.........	61.33	63.86	....	74.47	37.66	77.15

Digestibility of Tillson Company's Oat Dust.

Tilsonburg Oat Dust.	Organic matter.	Nitrogenous substances.	Alb.	Fat.	Crude fibre.	Soluble carbo-hydrates.
Sheep No. 1:						
Amount fed	4177.35	493.60	478.12	248.85	1017.09	2137.23
" excreted........	1791.44	152.97	....	43.71	687.28	953.68
" digested........	2385.91	340.63	....	205.14	329.81	1183.55
Dig. co-efficient.........	57.11	69.01	....	82.43	32.42	55.38
Sheep No. 2:						
Amount fed	4177.35	493.60	478.12	248.85	1017.09	2137.23
" excreted........	1902.75	158.95	....	49.84	758.96	751.24
" digested........	2274.60	334.65	....	199.01	258.13	1385.99
Dig. co-efficient.........	54.55	67.79	....	80.00	25.38	64.85
Sheep No. 3:						
Amount fed	4177.35	493.60	478.12	248.85	1017.09	2137.23
" excreted........	1548.97	128.51	....	42.19	554.31	670 20
" digested........	2628.38	365.09	....	206.66	462.78	1467.03
Dig. co-efficient.........	62.92	73.96	....	83.04	45.50	68.64

Digestibility of Tillson Company's Pea Bran.

Tilsonburg Pea Bran.	Organic Matter.	Nitrogenous Substances.	Alb.	Fat.	Crude Fibre.	Soluble Carbo-hydrates.
Sheep No. 1:						
Amount fed	4158.00	430.29	421.74	134.55	2209.72	1253.61
" excreted	1330.16	172.67	....	8.42	852.79	222.17
" digested	2827.84	257.62	....	126.13	1356.93	1031.44
Dig. Co-efficient	68.01	59.87	....	93.74	61.40	82.28
Sheep No. 3:						
Amount fed	4158.00	430.29	421.74	134 55	2209.72	1253.61
" excreted	1248.24	198.80	....	8.68	730.97	234.01
" digested	2909.76	231.49	....	125.87	1478.75	1019.60
Dig. Co-efficient	69.98	58.80	....	93 55	66.92	81.33

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DIGESTIBILITY OF THOMPSON'S PEA BRAN.

London Pea Bran.	Organic Matter.	Nitrogenous Substances.	Alb.	Fat.	Crude Fibre.	Soluble Carbo-hydrates.
Sheep No, 1:						
Amount fed............	4142.83	540.00	506.25	24.75	2446.02	1002.65
" excreted	1167.10	166.57	....	7.61	675.61	252.58
" digested	2975.73	373.43	....	17.14	1770.41	750.07
Dig. Co-efficient	71.82	69.15	....	68.85	72.38	74.80
Sheep No. 2:						
Amount fed.......... .	4142.83	540.00	506.25	24.75	2446.02	1002.65
" excreted	1129.11	143.41	....	6 70	634.36	285.31
" digested	3013.72	396.59	....	18.05	1811.66	717.34
Dig. Co-efficient	72.74	73.44	....	72.93	74.06	71.54
Sheep No. 3:						
Amount fed............	4142.83	540.00	506.25	24.75	2446.02	1002.65
" excreted	1187.00	127.58	....	9.17	730.20	261.69
" digested	2955.83	412.42	....	15.58	1715.82	740 96
Dig. Co-efficient	71.35	76.37	....	62.95	70.14	73.90

These foods are evidently of higher feeding value than is generally believed. The pea bran particularly is clearly a valuable feed, which alone not merely maintained the animals for nearly a month in a normal condition, but caused an actual increase of a few pounds in weight.

Before attempting to account for difference in digestibility in the case of the different animals and feeds, noticeable in these experiments we must do further work along this line.

In conclusion I beg to express my appreciation of the excellent accommodation afforded by our chemical laboratory for the work belonging to my department, and to acknowledge gratefully the valuable assistance of Robert Harcourt, B.S.A., our assistant chemist, and that of Wm. P. Gamble, B.S.A., special assistant in the sugar beet experiment.

Very respectfully submitted,

A. E. SHUTTLEWORTH,
Professor of Chemistry.

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PART VI.

REPORT OF PROFESSOR OF VETERINARY SCIENCE.

To the President of the Ontario Agricultural College:

SIR,—I beg leave to submit herewith my annual report for the year 1900.

CLASS-ROOM.

The class-room work has been much the same as usual, except that the course of lectures on anatomy had to be somewhat shortened on account of the College closing in the middle of April instead of the middle of June, as formerly.

First Year.

Lectures and demonstrations to the First Year consisted of a course on comparative anatomy, dealing especially with that of the horse, and noticing important differences between his anatomy and that of the ox. The course consisted of a brief consideration of the skeleton, ligaments, joints, muscles, tendons, and facia, and the digestive, respiratory, urinary, and generative systems; the circulatory and absorbent system; the nervous system, eye, skin and foot. During lectures on these subjects I had a living horse in the class-room; also a skeleton and individual bones and charts. As far as possible I avoided technicality, and made everything as plain as I could. I also gave a course of lectures on what we call "Practical Stable," speaking of the best material for building horse stables, the internal arrangements as to size and construction of single and box stalls, stall floors, feed boxes and mangers, ventilation and drainage; the general care of horses as regards feeding, watering, grooming, working, trimming manes, tails, etc., etc., the care of harness; also saddlery, etc. In addition to this I gave a course of lectures on judging horses. I selected some of the best specimens of each class at my command and compared and criticized them. Unfortunately for purposes of this kind, we labour at a disadvantage in not having fair specimens of the different breeds or classes of horses. We have, of course, in the farm stables, good ordinary work horses, and from my own stable I supply good saddle horses; but the other classes are not well represented.

During the winter term, I delivered to this class a course of lectures on Veterinary Materia Medica, in which I spoke of the general actions of medicines and the different modes of administration, with the advantages and disadvantages of each, and considered individually the drugs used for the prevention and cure of the ordinary diseases to which farm stock is subject, speaking of the properties, actions, uses and doses of each medicine.

Second Year.

The class-room work for this year in the fall term consisted in the consideration of the causes, symptoms, and treatment (both preventive and curative) of the ordinary diseases of farm stock. During this course, I usually have one of my horses in the class-room, and explain the different appearances of a diseased and a healthy animal. I have specimens of all diseases of bone, and when speaking of such I show to the students both a healthy and diseased part, explaining the difference and the cause, symptoms, nature, and treatment.

During the winter term, I delivered to this class a course of lectures on Veterinary Obstetrics, speaking of the general care of females during and after pregnancy, noticing the diseases and complications liable to occur to mother or offspring during parturition or after birth, giving special attention to the proper care of the young. As far as possible I illustrate these lectures with charts, a good supply of which we have. During this term I also gave a course of practical lectures and demonstrations called "Practical Horse," in which I demonstrate, with a living horse, the best methods of securing for

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minor operations, such as opening abscesses, dissecting out tumors, dressing and stitching wounds, firing for ringbone, spavin, and kindred diseases, the different methods of castration, etc., and illustrate the different methods of administering medicines, dressing teeth, scarifying lampas, bandaging, etc., etc. I also pay particular attention to the points of the horse, explaining the different desirable points in the various breeds or classes of horses, pointing out the differences in appearance between a healthy and a diseased animal, and illustrating the manner of examining a horse as to soundness. I also pass a probang into a cow and point out the place to puncture in case of bloating, etc.

Third Year.

To this class I gave a short course of lectures on the different breeds of horses.

To the special dairy class I delivered a short course of lectures upon the causes, symptoms and treatment (both preventive and curative) of the ordinary diseases to which dairy cattle are subject.

DISEASES AND AILMENTS OF STOCK.

Besides class-room work, I gave professional attention to all the stock belonging to the institution, and am pleased to be able to state that, while there has been considerable sickness among the stock, the losses have been few. Below will be seen the particulars of the diseases which have occurred:—

HORSES.—We had several cases of indigestion, colic, influenza, lymphangitis, calks, wounds, bruises, sore necks, sore shoulders, fungoid growths, eczema, leucorrhœa, etc., all of which recovered. We had one bad case of enteritis in one of the farm mares. The symptoms were very serious, and I did not think she would recover. I put her into a large box stall and gave her hypodermically 6 grs. morphine and ¼ gr. atrophine every hour for 4 doses, and at intervals of 2 hours afterwards for 4 more doses. These, of course were very large doses, but horses suffering from inflammation of the bowels can stand excessive doses of opium. This mare recovered, but was not able to work for nearly two weeks.

CATTLE.—We had a fatal case of puerperal septicaemia in a Devon cow, and a post mortem revealed the diagnosis to be correct. We also had three severe cases of parturient apoplexy (commonly called milk fever) in cows,—all of which made perfect recoveries. We had a fatal case of inflammation of the lungs in a grade Ayrshire cow. Besides these we had several cases of impaction of the rumen, a few of fardel bound, several of retention of the placenta, indurated udder, inflammation of the udder, sore teats, abscesses, inversions of vagina, obstruction of the milk ducts, etc., etc.,—all of which made complete or partial recoveries. We had a very peculiar case in a Holstein cow in the dairy herd. Her udder appeared normal until she gave birth to a fine healthy calf, and it then became enormously swollen, hot, and tender; but we could not get any milk or fluid of any kind from three of her teats, and the fourth gave only a few drops of a thin fluid. We gave her a purgative of 2 lbs. Epsom salts followed by two dr. doses of nitrate of potash twice daily, and kept hot poultices to the udder, and tried to milk her several times daily, but got practically nothing. At length the inflammation subsided and the swelling decreased until the udder regained its normal size; but we were not able to get any milk and she will have to be sold for beef.

SHEEP.—We lost one ewe from rupture of the uterus, and a few lambs from wool balls in the stomach, but had very little sickness otherwise.

PIGS.—We lost some newly born pigs, but our losses were very small.

I have the honor to be, Sir,

Your obedient servant,

J. H. REED,

Veterinary Surgeon.

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PART VII.

REPORT OF THE PROFESSOR OF DAIRYING.

To the President of the Ontario Agricultural College:

DEAR SIR,—I beg leave to submit my annual report of the Dairying Department.

In addition to a course of lectures, the First Year college students took practical farm dairy work one afternoon each week during the months of October and November; and the Second Year students received a course of lectures on co-operative dairying, and took the creamery course, as well as some practical work in cheesemaking. I trust that we shall be able to increase the amount of practical instruction and work in dairying for our regular college classes.

There were two sessions of the Dairy School in the year 1900. The factory and farm dairy courses were in session during January, February and March; and the creamery course for buttermakers was held in December. There were eighty-four students registered for all the classes. Seventy-six took the factory and farm dairy work; and eight, along with about sixty second year college students, attended the creamery class.

During the regular session there were twenty-three ladies in attendance, most of whom took the farm dairy and poultry work. Two of the ladies registered for the factory course, and passed all the necessary examinations. Fourteen students registered for special work in buttermaking, and three for special work in cheesemaking. The farm dairy class numbered twenty-four, most of whom were ladies.

We have added a special course in the month of February for experienced makers. This course is to be largely experimental work in connection with studies in the bacteriological and chemical laboratories. All the dairy classes will also take work in practical dairy bacteriology and dairy chemistry. We hope thus to give our dairy students a thorough grounding in the science and practice of dairy husbandry. The scarcity of milk prevents us from giving as much practical work as I could wish to our dairy classes.

PASTEURIZATION OF MILK FOR BUTTERMAKING.

A series of experiments were conducted during the year, in which vats of milk were heated before separating to temperatures as follows: between 140° and 150° F, 150° and 160°, 170° and 180°, 180° and 190°, 190° and 200° F.; and the results were compared with heating vats of similar milk to a temperature between 90° and 100°F. before separating. In all the trials the milk was thoroughly mixed in a large vat and then equally divided, and one-half was heated to the temperature of 90° to 100°, and the other half to temperatures between 140° and 200°F. The milk was received at the dairy at temperatures between 50° and 70°F. The main results were:

1. Milk heated to 140° to 200° before being separated had less loss of fat in both skim milk and buttermilk than milk separated at 90° to 100°. The cream from the milk separated at the higher temperatures contained a higher percentage of fat, was less in bulk, churned in less time, and produced slightly more butter. There was more sediment or "mud" in the separator bowl after running through the pasteurized milk than there was from the unpasteurized milk.

2. The creaming quality of the milk by the gravity process decreased with an increased temperature before setting. The whole milk averaged 4.08 per cent. fat. The skim milk contained 3.08 per cent. fat when the whole milk was heated to 180° before setting. Heating to 170° before setting produced skim milk testing 3.2 per cent. fat, heating to 165°, 1.8; 160°, 1.6; 150°, 1.0; 140°, .88. Similar samples of milk which were set at the ordinary temperature, without heating, gave skim milk testing an average of .51 per cent fat. All the lots were set for 24 hours in water which was at a temperature of 40° to 45°. Tests with the creamometer showed a very indistinct "cream line" in all the heated samples, and especially was this so in those heated above 140°F.

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3. The keeping quality of the butter, and also of the skim-milk, was much improved by heating the whole milk to the higher temperature before separating. Three boxes of butter made in May—one from unpasteurized milk, one one from milk heated to 140°, and another from milk heated to 190°—were kept at an average temperature of about 55° until August 17th. These boxes were examined from time to time, and it was found that the box made from milk heated to 190° held its flavor best and was quite as good in other respects. On August 17th the scores for flavor were 38, 35 and 32 (max. 45) in the order of decreasing temperature at the time of separating.

4. The moisture content of the pasteurized butter was 10.77 per cent—one per cent. less than the sample of butter made from unpasteurized milk.

Conclusions.—Good butter can be made from milk and cream without pasteurization; but pasteurization of the milk or cream tends to produce uniformity of product and adds to the keeping quality of the butter. The higher the temperature of the milk the better is the keeping quality of the milk and butter, but the greater is the expense for heating and cooling.

In pasteurizing *cream* at temperatures above 160° there is probably some danger of giving a "cooked flavor" to the butter; but so far as our experience goes, we have not noticed any "cooked flavor" on butter made from milk pasteurized within the range mentioned above

The skim-milk is also in better condition to return to the farm after pasteurization, especially if it is heated and then cooled below 60° before leaving the creamery.

Moisture in Butter.

Various methods of handling butter were adopted to ascertain the effect on the moisture retained in the finished product. All the lots were churned and worked in a Simplex churn and worker, except the lots salted with varying amounts of salt. These lots were worked with a hand lever worker, as nearly alike as possible.

Butter churned at temperatures between 46° and 56° did not give results sufficiently uniform to base conclusions upon. The percentage of moisture varied from 8.675 to 11.425.

Butter churned in granules like clover seed contained an average of 11 15 per cent. of moisture; perfect granular butter contained 11.449 per cent.; large granular butter contained 10.86; and butter churned into grains like corn had an average of 11.57 per cent. moisture.

Butter washed with water at temperatures between 46° and 59° also lacked uniformity of results. The moisture content varied from 9.825 to 12 63 per cent.

Butter salted at the rate of one-quarter ounce, one half ounce, three-quarter ounce, and one ounce of salt per pound of butter contained respectively 11.292, 10.47, 9.802, and 9.472 per cent. of moisture, while similar butters to which no salt was added contained an average of 12.377 per cent. moisture.

Butter salted with "paste" (wet salt) contained an average of 10.55 per cent. moisture, while butter from the same churnings, handled in exactly the same way, except that the salt was applied in the dry form, contained an average of 10.75 per cent of moisture in the finished butter.

Butter worked by giving the worker twenty revolutions contained an average of 12.34 per cent. of moisture; and similar butter, worked with thirty revolutions of the worker, contained 9.425 per cent. of moisture.

The results in moisture-content from working butter once, twice and thrice were inconclusive. Hence a series of experiments with a view to reach a reliable conclusion, under this head, will be made next year.

Duplicate samples of these butters were scored—once soon after being made, and again in from two to four weeks after the first scoring. The results were:

1. The higher the temperature of the cream at churning the poorer the quality of the butter.

2. The quality of the finished butter is but slightly affected by the size and shape of the granules at the completion of churning when a combined churn and worker is used.

3. The average score of the butter worked once, twice and three times was respectively 93, 93.6 and 95 at the first scoring; and 89.6, 86.8 and 89 at the second scoring,

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The Overrun in Buttermaking.

What is known as the "overrun" (excess of butter over fat in milk) in buttermaking has caused considerable discussion: (1) as to who is the owner of it, and (2) as to what the overrun should be in good creamery practice.

The overrun undoubtedly belongs to the patrons of the creamery, unless otherwise stipulated. On the second point, many conditions—such as the weighing and testing of the milk, the amount of fat lost in separating and handling of the milk, cream and butter; the amount of curd, salt, moisture, etc., incorporated in the butter; the extra weight given to make the butter "hold out weight"; the length of time the butter is held in cold storage; and the amount of leakage—make it impossible to lay down any definite rules for the overrun.

In our pasteurizing experiments, when the milk tested an average of 3.66 per cent. of fat, the overrun was thirteen per cent.—*i.e.*, for every one hundred pounds of fat delivered in the milk by the patrons we made one hundred and thirteen pounds of marketable butter. In the month of August, when the milk tested 3.4 to 3.8 per cent. of fat, our average overrun was 12.6 per cent. In September, when the test of whole milk varied from 3.6 to 3.9 the overrun varied from 10.2 to 15.3 per cent. and averaged 13.1 per cent. Owing to the fact that the quantity of milk handled in our creamery is small—1,000 to 2,000 lbs. daily—our mechanical losses are proportionately greater than they would be in a larger creamery.

Washing Curd.

A number of tests were made during the past season to see the effects of washing curds with different quantities of water and with water at different temperatures. The curd from a vat of milk was divided into two equal parts after milling. One-half was washed and the other half was not washed. In the first series we compared cheese made by washing curds with a quantity of water equal to the weight of the curd with cheese made from similar curds, but unwashed. The temperatures of the water were 90°, 95°, 100°, 105° and 110°. In the second series, we compared the effects of washing curds with a quantity of water equal to twice the weight of the curd, with the results from similar curds unwashed. The temperature of the water varied from 90° to 110°, as in the first series. The results may be summarized as follows:

1. Washing curds after milling tends to improve the flavor of cheese. especially of cheese made from curds bad in flavor. Cheese made from washed curds had a tendency to be open. There was little difference in the general quality of the cheese made from washed and unwashed curds when the milk was in good condition.

2. Washing curds tends to reduce the yield of cheese. The average loss in our experiments was 1.12 pounds of cured cheese per 1000 pounds of milk.

3. There was not much difference in the results from washing with water at temperatures ranging from 90° to 110°. The average loss of cheese was somewhat less from washing with water at 90°; but the quality of the cheese was better with water at 110°.

Curing Cheese at Different Temperatures.

This is the third year for this experiment. Green cheese from the same vat of milk were placed in three different rooms maintained at average temperatures of about, 60°, 65° and 70°. Part of the cheese were made in the College Dairy, and three green cheese each month, from June to October, were purchased from Mr. A T. Bell, Tavistock. A like number were bought from Mr. T. B. Millar, London, each month. One cheese from each lot was placed in the rooms at the temperatures given, after being weighed and branded.

The cheese made in the College Dairy lost in weight an average of 4.31 per cent. during one month when cured at an average temperature of 59.6°; they lost 4.64 per cent. when cured at an average temperature of 64.9°, and 5 13 per cent. when cured at 68 8°. The average percentage of moisture in the air of these rooms was respectively 75 7, 80.8, and 73.6.

The average score of the cheese was: Flavor, 36 05, 35.49, 34 24 (max. 40); texture, 17.77, 16.92, 16.14 (max. 20); total, 92.15, 90.33, 87.69 (max. 100) from curing at temperatures of about 60°, 65° and 70°, respectively.

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These results agree with those obtained in former experiments. The curing of cheese weighing about 30 lbs, at an average temperature of 60°, resulted in a saving of about one per cent. shrinkage as compared with curing cheese at 70°. The quality of the cheese was also much better from curing at the lower temperature of about 60° to 65°.

The cheese bought from Messrs. Bell and Millar gave results similar to those obtained from our own cheese, except that the shrinkage was much less—due, no doubt to the larger size of these cheese, which averaged 80 to 90 pounds each. The shrinkage in one month was respectively 2.13, 2.31 and 2.53 per cent. in the Tavistock Cheese, cured at about 60°, 65° and 70°. The London cheese, cured at the same temperatures, shrank 2.44, 2.76 and 2.91 per cent. The average score of the Tavistock cheese was 93.18, 92.13 and 90.06; and the score of the London cheese was 90.62, 88.06 and 85, both cured at about 60°, 65° and 70°.

The saving of shrinkage by curing at the lower temperature was about one half of one per cent. as compared with curing at about 70°. The quality of the cheese was also better when cured at about 60°.

Tests were also made by placing two, of five green cheese, from one vat of milk, into a room at an average temperature of 68 7° for a week, then removing them—one to a room maintained at an average temperate of 59.6°, and the other to a room kept at an average temperature of 64.9°.

The average score of the cheese cured for the whole period at 59.6° was 92.43. The score of similar cheese, first placed in a warm room fot a week and then finished in the cool room was 91.57°. The cheese cured at 64.9° degrees scored an average of 89.86, while those put in the warm room for a week and then removed to the cooler room, scored 89.57. The cheese cured at 68.8° for the whole period scored an average of 88.57.

Conclusions.—An average temperature of 60° to 65° appears to be favorable to curing Canadian Cheddar cheese in summer; and there is apparently no advantage in placing cheese in a warm room for a week and then removing them to a cool room to finish the curing process.

Caring for Milk Used in Cheesemaking.

The milk from the Dairy herd was used to investigate further methods of caring for milk. The trials related to,—aëration, holding milk over night in small and large quantities, effect of adding culture at night to milk kept at average temperatures of 46° and 62°, the effects of four cultures: O.A.C., Keith's, Hansen's and buttermilk.

Aëration.—The average yield of cheese was the same, whether milk was aërated or not. There was little or no difference in the score of the cheese made from aërated and unaërated milk, what difference there was being in favor of the cheese made from unaërated milk.

Milk Kept in Large vs. Small Cans Over Night.—Half of the night's milk on several occasions was kept in a large can over night. The other half was placed in five shotgun cans holding about thirty pounds each. In all cases in which both the large and the small cans were set in a tank of cold water, there was little difference in the milk next morning, and there was no difference in the quality of the cheese. When both lots were allowed to stand in the air without any cooling by means of ice or water, the lots kept in small quantities were sweeter and better the following morning. The chief advantage of keeping milk in pails over night is that it cools more rapidly than in cans, and hence is likely to reach the factory in a sweeter condition during hot weather, especially where no ice or cold water is used for cooling.

Culture Added to Milk at Night vs. Culture Added in Morning.—Half the evening's milk was cooled to 62° and from one ounce to one pound of culture or starter was added to about 150 pounds milk at night. The other half was also cooled to 62°, but no starter was added until the following morning, after half the morning's milk had been mixed with the milk of the night before. The other half of the morning's milk was mixed with that portion of the evening's milk which had been cooled and to which starter had been added the night before. The general results were as follows:

1. Milk cooled so that it was at an average temperature of 62° the following morning, and to which starter was added in the evening, was usually free from gas, but it worked too fast for the making of fine cheese in hot weather.

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2. There was very little difference in the yield of cheese whether or not culture was added to the milk on the evening previous.

ADDING CULTURE TO NIGHT'S MILK COOLED TO A LOW TEMPERATURE.—In order to check the acidity of the milk, and at the same time to gain control of the flavor, similar experiments to those preceding were made, except that the evening milk was cooled so that it was at an average temperature of 46° the following morning. From one ounce to one pound of starter was added to half the milk in the evening. The average rennet test in the morning of the milk to which culture was added the previous evening was thirty-one seconds. The lots cooled to 46° but to which no culture was added in the evening, tested forty-one seconds in the morning. The chief characteristic of the milk cooled, and to which starter was added in the evening, was a ripe, mellow, pleasant flavor the following morning. This method of handling milk did not increase the yield of cheese, but gave a decidedly improved quality of cheese. The milk on the evening of August 14th was cooled to 48°. The following morning, the morning's milk was added and the whole was thoroughly mixed in a vat. The mixed milk was divided into two vats, one of which was made into cheese without any starter, and to the other was added one per cent. of starter. The milk to which the starter was added required nearly two hours to ripen for the rennet. It had no gas and made a nice cheese. The other vat to which no culture was added developed a great deal of gas, worked slowly, was not ready to salt until eleven o'clock at night, and produced a cheese of very poor quality. Milk cooled to a low temperature at night must have a proper culture added in the morning in order to produce good cheese. Milk handled in this way is a very prolific source of gas, and the cheesemaker can best overcome the gas by the judicious use of a pure culture.

August 21st the milk from the dairy herd was divided into two vats. The previous evening's milk had been cooled to 49°, and was mixed with the warm morning's milk. One per cent. of Hansen's culture was added to the milk in one vat, and to the other vat the same amount of Keith's Boston culture was added. The score of the cheese was ninety-four and eighty-seven points respectively.

August 22nd Hansen's and O.A.C. cultures were used under similar conditions to those reported. The score of the cheese was ninety-five and ninety-three in favor of Hansen's.

Buttermilk of good flavor gave excellent results when used for a culture or starter in cheesemaking.

We may add that the last Boston culture we obtained proved much superior to the first ones, and proved very satisfactory in both butter and cheesemaking.

APPLES, APPLE POMACE, RAPE, AND TURNIP TOPS FED TO DAIRY COWS.

In order to test the value of the above foods for cows, and also to see the effects of a food known as the "Virginia Cattle Food" for purifying milk, we selected a number of cows and fed them on these usually prohibited foods, with and without the "purifier."

Three cows when fed on about one-half bushel of pulped apples each per day in addition to their regular feed, gave 1,122 lbs. milk in sixteen days. For the sixteen days previous to the test they gave 1,174 lbs. milk, and for the same period succeeding the test they gave 1,015 lbs. milk.

Three other cows gave 1,063 lbs. milk in sixteen days, when apple pomace (one-half bushel per cow) was added to the regular ration. They gave 1,003 lbs. milk in sixteen days previous to the test. The pomace was continued for one week longer than the apples to note whether the milk flow would still be maintained, and they gave 438 lbs. milk for the week. During the following week, when the pomace was not fed, they gave 423 lbs. milk, or failed 15 lbs. in the week.

For the last three days of the first test with pomace and apples, the meal was reduced two pounds per cow each day, and the pomace maintained the milk flow well, as they gave 200 lbs. when receiving the pomace and a reduced meal ration, while in three days on the full meal ration they gave 204 lbs. The cows on the apples and reduced meal ration lost in their milk flow considerably.

Six cows were selected for an experiment in feeding rape; but two of them refused the rape, so that four finished the test. The rape was cut in the field, hauled to the stable, run through the cutting box, and then was fed with meal placed on top in the

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manger. The four cows gave 1,848 lbs. of milk in two weeks previous to feeding the rape, and 1,852 lbs. in two weeks when rape was substituted for corn silage. Each cow was fed all the rape she would eat—about 55 lbs. per day. The average test of the milk previous to feeding rape was 3.0 per cent. fat, and during the rape feeding the average test for fat was 3.3 per cent.

From Nov. 7th to Nov. 18th six cows were fed on turnip tops taken from the turnip field and fed to the cows in the stable, in addition to their regular feed. The yield of milk was 1,685 pounds for twelve days previous to the test, 1753 pounds for the twelve days of the test, and 1,656 pounds for the twelve days following the trial. They gained 68 lbs. during the test and lost 97 lbs. in twelve days after the tops were withdrawn.

"Virginia Cattle Food" was added to the ration for about half the period of feeding the different foods mentioned. So far as we observed the "Food" had little or no effect upon the health of the animals, nor upon the flow of the milk. The amount of the "Food" given varied from one to two tablespoonfuls fed to each cow twice a day. It was placed on the dry meal given to the cows.

On October 5th a vat of milk, from cows which had been fed rape for some time, was made into cheese. The milk appeared to be of good flavor, but the curd developed gas and worked slowly. Nov. 27th this cheese was scored individually by Messrs. A. T. Bell, T. B. Millar, and G. J. Brill. Their score was 36, 34 and 32 respectively, out of a possible 40 for flavor. The three judges collectively agreed on a score of 28 points for flavor as being more nearly its value.

October 9th another cheese was made of milk from the same cows as on the 5th, but to the rape feed was added two tablespoonfuls per cow each day of the "Virginia Cattle Food." The milk had no flavor of rape and the curd worked nicely. The individual scores of the three judges in flavor were 37, 34 and 33. The collective score was placed at 31—three points ahead of the cheese made from rape milk on the 5th when no "Purifier" was added to the cows' ration.

On the same date, a vat of milk from cows fed on apples and apple pomace was made into cheese. The milk had a flavor of apples such as is common in the autumn. The curd also had an apple flavor. The cheese was scored by the three judges named and they gave it a score of 36, 34 and 37 individually. Their collective score was 33 out of a possible 40.

October 12th a cheese was made from milk of the same cows and fed in the same manner, except that the "Purifier" was added to the meal. The milk was "fair" in flavor, but the curd had a flavor of apples. The cheese was scored 37, 32 and 36 individually by the three judges and was finally given a score of 33—the same as was given to the cheese made on the 9th without the "Purifier."

Similar experiments to those made in cheesemaking were conducted to note the effects of these foods, with and without the "Purifier" in making butter. The average score of the butter in flavor made from milk where cows were fed rape without the "Food" was 40.6 (max. 45). When rape was fed, to which was added the "Food," the average score for flavor was 41.3. Butter made from milk produced by feeding apples and apple pomace scored an average of 37.5 points for flavor without the "Food," and 36.6 with the "Food." Cows fed on apples and the "Food" in addition to the regular ration, produced milk which made butter with an average score of 33 points for flavor. The butter from pomace milk scored an average of 38 points for flavor without the "Food," and 36 points with the "Food" added to the meal ration.

Turnip tops were next fed to cows with and without the "Purifier," and the milk was made into butter. The average score for flavor was 38 6 with the "Purifier," and 38.3 without it.

Conclusions—The addition of "Virginia Cattle Food" to the ration of rape and turnip tops improved to some extent the flavor of both cheese and butter; but in the case of apples and apple pomace, no improvement was discernible.

Colostrum Milk.

Tests of the composition and changes in colostrum milk were made with a Short-horn grade cow, a Holstein grade and a cow of no particular breeding.

The Short-horn grade gave milk with a specific gravity of 1.077 and 2.1 per cent. fat

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at the first milking after calving. The second milking had a gravity of 1.038 and 4.8 per cent. fat. The third milking was high in solids not fat, and continued to give the purple precipitate when sulphuric acid was added to the milk. The seventh milking appeared to be normal, with a gravity of 1.035, and contained 3 per cent. fat. The tenth and succeeding milkings ranged from 1.0335 to 1.034 in gravity, and had a fat content of 3.3 to 3.6 per cent.

The Holstein grade gave milk with a gravity of 1.042 and 5 per cent. fat at her first milking. The second milking tested 1.035 and 5 per cent. fat. The third tested 1.034 in gravity and 4 5 per cent. fat. The gravity of the eighth milking was 1.0355, and fat content 3.9 per cent. The sample appeared to be normal, except for a tinge of purple in the precipitate after adding sulphuric acid. The 18th milking had a gravity of 1.037 and a fat content of 4.6 per cent. This milk had a bluish appearance and judged by its color it would be classed as poor milk. The 21st milking had a gravity of 1.0345 and was apparently normal.

The third cow gave milk with a gravity of 1.074 and 1.6 per cent. fat at her first milking. She developed symptoms of milk fever shortly after calving. What milk she gave was very high in color, low in fat (1.8 per cent.), and had a gravity of 1.037 at the fourth milking. The seventh milking tested 2.5 per cent. fat, and had gravity of 1.0385. The flavor was strong. The tenth milking was high in color, viscous, had a gravity of 1.0326, and contained 6.1 per cent. fat. The 21st milking tested 3 5 per cent. fat and 1.0345 gravity. Conclusions: Colostrum milk varies a great deal in fat and total solids. 2. Colostrum milk does not become normal, in many cases, so soon as is usually supposed. It is probable that instead of the eighth or ninth milking being fit for table use, in the case of some cows it is the 21st milking before it is normal.

Calf Feeds.

Numerous substitutes for the cream of milk have been placed on the market for feeding calves—with and without skim-milk. What is known as Bibby's Cream-equivalent has been tested by us to a limited extent during the past year. Four grade calves were selected for the first test on Sept. 24th, 1900. Three of the calves were dropped in June and one in August. Two of the calves were fed on skim milk and "Bibby" for three weeks, and the other two were fed on skim-milk and ground oats and bran for the same length of time. After one week, during which the feed of the calves was gradually changed, the two receiving bran and oats were fed "Bibby" and the two fed on "Bibby" were changed to bran and oats. The "Bibby" meal was made into a gruel, according to directions, and the bran and oats were fed partly dry and partly in the skim-milk, according to the preferences of the calves. The greater portion of the bran and oats was fed dry.

The gain of two calves in six weeks on skim-milk and "Bibby's Cream-equivalent," to which one pound of bran and oats was added in the second period was 114 pounds. The gain of the two calves in six weeks on skim milk, bran and oats was 141 pounds. All the calves made a greater gain on bran and oats added to the skim-milk than they did when "Bibby" was added to the skim milk. In the case of three of the calves, the difference was but from one to six pounds in the three weeks. The chief difference was in the case of the youngest calf, dropped on August 17th.

A second trial was made with a young Holstein calf which received whole milk until it was about two weeks old, when it was gradually changed to skim-milk and "Bibby's Cream-equivalent." During eleven days the calf gained 15 pounds on this ration. During the next 11 days, when bran and oats were fed dry in addition to skim milk, the calf gained 26 pounds. From these two tests, which are not to be considered conclusive, we should judge that bran and oats fed in *dry form* as soon as the calf will eat them, are better and cheaper substitutes for cream than "Bibby's Cream-equivalent."

The Dairy Herd.

The herd in the Dairy department on December 31st, 1900, consists of nineteen grade cows, nine pure-bred Holstein cows, five Jersey cows, one Holstein heifer, one Ayrshire heifer and one Ayrshire bull calf, two grade heifers, three Holstein heifer calves, one Jersey heifer calf, and five grade heifer calves, making a total of forty-seven.

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Twenty-three cows were in the herd for a full year. The greatest number of days which one cow milked was 346, the least number was 223. and the average was 300 days. The largest yield of milk was 9,477 lbs., the smallest yield was 4,157 lbs., and the average was 7,179 lbs. The highest yearly average percentage of fat was 6.0, the lowest 3.1 and the average 3.87. The highest yield of fat was 357.42 lbs., the lowest was 166.07 lbs., and the average 270.07 lbs. The highest yield of butter, calculated by adding fifteen per cent. to the fat, was 411.03 lbs., the lowest 190.98 lbs., and the average for the twenty-three cows was 310.59 lbs.

In former years our yearly record closed on November 30th; but, in order to make the herd record close with the calendar year, we have included the records for December, 1900, so that the yearly record which follows is for the twelve calendar months of 1900.

RECORD OF THE DAIRY HERD FROM JAN. 1, 1900, TO DEC. 31, 1900.

Name of cow.	Weight.	Calved.	Breed.	No. of days milking.	Total lbs. milk.	Per cent. fat. Highest monthly average.	Per cent. fat. Lowest monthly average.	Yearly average.	Total lbs. fat.	Total lbs. butter, adding 15% to butter fat.
	lbs.									
Bella	1,222	June 18, 1900.	Ayrshire Grade.	296	6,860	3.7	3.2	3.44	236.26	271.70
Belle Temple	1,051	Jan. 11, "	Jersey	309	4,958	6.0	4.6	5.00	247.11	284.17
Bernard	1,019	Aug. 10, "	Grade	312	8,725	5.2	3.2	3 69	322.45	370.82
Darkey	1,230	April 19, "	"	294	9,312	4.0	3.0	3.59	334.41	384.57
Dolly	1,345	Dec. 8, "	Holstein Grade.	278	7,410	4.0	3.0	3.50	259.68	298.63
Grey	1,150	Aug. 17, "	Short-horn "	255	6,925	5.0	3.2	3.85	266.88	306.91
Jean 2nd	886	Jan. 17, "	Holstein "	346	5,248	4.8	3.6	3.99	209.35	240.74
Lilly	979	Oct. 20, "	Jersey	341	5,498	6.0	4.4	5.40	297.39	342.00
Lucy	1,195	Jan. 24, "	Holstein Grade.	337	7,225	4.5	3.3	3.75	270.86	311.48
Margaret	1,681	Dec. 16, "	"	223	4,933	3.8	3.2	3.40	166 07	190.98
Margaret Cornelius	1,235	April 2, "	"	323	9,336	3.7	2.7	3.05	284.49	327.16
Megg 1st	1,490	" 11, "	"	252	8,876	4.2	2.8	3.10	275.36	316.66
Megg Young	1,240	Jan. 29, "	"	315	7,056	4.2	3.0	3.27	231.15	265.82
Molly	1,441	" 4, "	" Grade.	300	8,547	4.0	3.1	3.48	297.94	342.63
Moss	1,050	June 18, "	Jersey "	310	6,330	5.8	2.9	4.20	266.11	306.03
McGill	1,113	" 14, "	Grade	295	6,727	5.6	2.7	3.35	225.37	259.17
Nellie	918	Oct. 31, "	"	327	7,806	4.2	3.4	3.87	302.29	347.63
Number 20	1,095	Dec. 16, "	"	313	8,948	4.5	3.3	3.99	357.42	411.03
Ontario Belle	972	Sept. 19, "	Jersey	315	4,157	6.4	5.3	6.00	249.05	286.41
Patience	......	Mar. 24, "	Ayrshire	249	6,809	5.2	3.4	3.63	246.12	283.03
Polly	1,229	Jan. 24, "	Holstein Grade.	337	8,115	4.5	3.0	3.30	267.58	307.71
Reddy	885	May 8, "	Grade	268	5,847	6.4	3 6	4.42	258.47	297.24
Topsy	1,067	" 21, "	"	299	9,477	4.2	3 0	3.59	340.00	391.10
Average 23 cows.	1,156	....	....	300	7,179	......	......	3.87	270 07	310.59

All of which is respectfully submitted.

H. H. DEAN,
Prof. of Dairy Husbandry.

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PART VIII.

REPORT OF THE PROFESSOR OF AGRICULTURE.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith my eighth annual report.

My work during the year may be divided into three main divisions, viz., teaching, live stock experiments, and farm superintendence. The work in teaching is not of general interest, and is outlined in the College Circular, though I may say in passing that I have tried to make this work as practical as possible, and have devoted a great part of the time to drill in stock judging.

LIVE STOCK EXPERIMENTS.

Under this head we have some important work to report, though a considerable portion of it constitutes repetitions of previous tests. There is only one way, however, of obtaining reliable results, and that is by careful repetitions. I trust, therefore, that the public will not lose patience, and that quality of work will be regarded as more important than quantity.

HEAVY, MEDIUM, AND LIGHT MEAL RATIONS FOR FATTENING STEERS.

This is the fourth experiment with different quantities of meal for fattening steers; and as the results of each experiment indicate practically the same thing, the experiments will not be repeated.

Twelve steers were divided into three groups of four each. With the heavy ration group, the object was to feed as heavy a meal ration as the steers could be induced to eat. With the medium ration group, the aim was to feed about two-thirds of a pound of meal per day per hundred pounds live weight of the animals. The steers in the light ration group were started on a little over one-third of a pound of meal per day per hundred pounds of their live weight, and the meal was gradually increased as the feeding period advanced, the aim being to have the meal ration average about one-half of a pound of meal per day per hundred pounds of the average live weight of the steers throughout the feeding period. The following table shows how the meal rations were increased:

Period.	Meal per steer per day.		
	Heavy ration.	Medium ration.	Light ration.
From Dec. 1st to Jan. 6th	9 lbs.	7 lbs.	4 lbs.
" Jan. 7th to Jan. 31st	10 "	8 "	5 "
" Feb. 1st to March 14th	11 "	9 "	6 "
" March 15th to April 15th	12 "	9 "	8 "
" April 16th to June 5th	12 "	9 "	9 "

The meal actually consumed per day per hundred pounds of live weight of the animals throughout the feeding period was as follows: Heavy ration, .85 lb.; medium ration, .66 lb.; light ration, .51 lb.

In addition to the meal, the steers were fed hay and roots. The hay was cut and mixed with pulped roots a day in advance of feeding, in the proportion of four pounds of roots to three pounds of hay.

After a month's preliminary feeding, the experiment proper commenced December 1st, and closed June 5th,—a period of 187 days.

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The foods were valued as follows: Meal, $13; hay, $6; and roots $2 per ton. While the valuation of the foods may be open to criticism, it serves as a basis of comparison, and this is all that is required.

Below is given a statement of the gains made by the steers, and the cost of a pound of gain in the experiment of 1900:

Heavy Ration—	Average daily gain, 1.80 lbs.	Cost of 1 lb. gain,	7.67c.
Medium Ration—	" " 1.87 "	" " "	6.97c.
Light Ration—	" " 1.87 "	" " "	6.36c.

It will be seen that the medium and light ration steers made equal gains in weight, and that they made larger gains than the heavy ration steers. This last experiment, therefore, is very strongly in favor of the light ration.

The average results of the four years' work should afford conclusive evidence regarding the relative economy of the different methods of feeding, and therefore the average results of the experiments conducted in 1897, 1898, 1899 and 1900 are given below:—

Heavy Ration—	Average daily gain, 1.76 lbs.	Cost of 1 lb. gain,	7.35c.
Medium Ration—	" " 1.74 "	" " "	6.76c.
Light Ration—	" " 1.68 "	" " "	6.48c.

Summary and Conclusions.

1. In the average of four trials, a comparatively heavy meal ration gave slightly larger but more expensive gains than those obtained with lighter rations.
2. In the average of four trials, the most economical gains were obtained by commencing with about one-third of a pound of meal per day per hundred pounds live weight of the animals, and gradually increasing, the rate of increase being such that on the average of the whole feeding period, the steers received one-half of a pound of meal per day per hundred pounds of their live weight.
3. A finished steer is fed at a loss; therefore, in economical feeding, an effort must be made not to have the animals finished for any considerable time before they can be disposed of.
4. The method of feeding recommended is suitable for somewhat long feeding periods. Shorter feeding periods would call for a more rapid increase in the meal ration.

Corn vs. Peas for Fattening Steers.

Of late years corn has attracted a good deal of attention as a stock food, and I have received a large number of questions regarding its feeding value as compared with peas. This has led to the commencement of a series of experiments with these foods.

Of the steers used in the experiment with different quantities of meal, half were fed corn in combination with other foods, and half were fed peas in a similar combination. It was deemed advisable, however, to discard one of the steers, so that the experiment was conducted as follows:—

Six steers, equal parts by weight of corn, barley and oats for 36 days; three parts corn to one part oats by weight for 151 days.

Five steers, equal parts by weight of peas, barley and oats for 36 days; three parts peas to one part oats by weight for 151 days.

The other foods used have already been described in the experiment with different quantities of meal,

Following is a brief statement of results:—

Corn group—	average gain per steer in 187 days, 341.5 lbs.	Meal consumed per lb. gain,	4.73 lbs.
Pea group—	" " " 348.6 "	" "	4.64 "

In this experiment, therefore, the meal mixture containing peas gave slightly larger gains than that containing corn; but when the relative cost per ton of corn and peas was taken into account the corn mixture gave decidedly cheaper gains. In this one test the pea mixture was not worth quite 50c. per ton more than the corn mixture, whereas the actual cost of the pea mixture was between $2 and $3 per ton more than the corn mixture.

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Experiments with Pure-Bred Swine.

This year we conducted our fifth experiment with pure-bred swine. The objects of the experiment were:

1. To compare six breeds of swine:
   (a) With regard to relative economy of production.
   (b) With regard to suitability for the export bacon trade.
2. To compare corn with barley:
   (a) With regard to amount required for a pound of gain.
   (b) With regard to quality of bacon produced.

Plan of experiment.—Six animals of each of the following breeds were used:—Yorkshire, Tamworth, Berkshire, Chester White, Poland China, and Duroc Jersey. Each breed was divided into two lots of three hogs each. Three hogs of each breed were fed corn and wheat middlings, and the remainder were fed barley and wheat middlings. The method of feeding can best be shown by means of a table.

	Group I. (corn).	Group II. (barley).
June 26th to July 20th	1 part corn to 3 parts middlings ..	1 part barley to 3 parts middlings.
July 21st to Aug. 26th	1 " 1 " ..	1 " 1 "
Aug. 27th to Nov. 13th	3 " 1 " ..	3 " 1 "

The pigs were from ten to twelve weeks old at the beginning of the experiment. On November 14th six Yorkshires, six Duroc Jerseys, one Berkshire and one Poland China were sent to the factory. The remaining hogs, not being heavy enough, were not shipped until December 26th. Three of the Tamworths and three of the Chester Whites became very unthrifty and were therefore discarded, so that the results with these two breeds are derived from only three hogs of each breed. In the case of the other four breeds the calculations are based upon six animals of each breed.

A small amount of skim-milk was used at the commencement of the experiment; but as it was the same for each breed it has not been taken into consideration in making calculations.

Meal Required for 100 lbs. Gain Live Weight.—Below is given a statement of the average daily gain per hog and the meal consumed per 100 lbs. gain live weight.

Berkshire:	Average daily gain per hog,	.808 lb.	Meal per 100 lbs. gain,	409 lbs.
Yorkshire:	" " "	.930 "	" " " "	422 "
Duroc Jersey:	" " "	.883 "	" " " "	426 "
Chester White:	" " "	.666 "	" " " "	433 "
Tamworth:	" " "	.642 "	" " " "	462 "
Poland China:	" " "	.701 "	" " " "	474 "

The standing of the different breeds with regard to economy of gain has varied considerably from year to year, and to illustrate this point the following table is given, which shows the standing of the breeds in each year. In each case, the breeds are arranged in order of economy of production.

1896.	1897.	1898.	1899.	1900.
1. Berkshire.	1. Berkshire.	1. Yorkshire.	1. Berkshire.	1. Berkshire.
2. Tamworth.	2. Tamworth.	2. Berkshire.	2. Tamworth.	2. Yorkshire.
3. Poland China.	3. Poland China.	3. Duroc Jersey.	3. Yorkshire.	3. Duroc Jersey.
4. Duroc Jersey.	4. Chester White.	4 { Tamworth.	4. Chester White.	4. Chester White.
5. Chester White.	5. Yorkshire.	Chester White.	5. Duroc Jersey.	5. Tamworth.
6. Yorkshire.	6. Duroc Jersey.	6. Poland China.	6. Poland China.	6. Poland China.

Perhaps the most noteworthy point in connection with this table is the good average showing made by the Yorkshires and Tamworths, the two breeds which have been scored highest by the packers as regards suitability for the export bacon trade. This result is in direct opposition to the theory that it necessarily costs more to produce a pound of gain in the bacon hog than in fatter types.

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Suitability for Export : Below is given the classification of the hogs by experts at the Wm. Davies Co.'s factory. This classification has nothing to do with the firmness of the bacon, but is based entirely upon the conformation of the carcases, which were critically examined as they hung on the rail in the packing house. The names of the breeds were not stated until after the examination had been made; so there can be no charge of prejudice.

Following is the explanation of the terms employed in describing the carcases:

"*No. 1 selection,*" suitable for best "Wiltshire sides."

"*No. 2 selection,*" rather too fat for best "Wiltshire sides."

"*Fat,*" entirely too fat for "Wiltshire sides."

"*No. 3 selection,*" too light and thin for "Wiltshire sides."

The following table shows how the carcases of each breed were graded:

Breed.	No. 1 selection.	No. 2 selection.	Fat.	No. 3 selection.
Yorkshire, 6 carcases	6	0	0	0
Berkshire, 6 "	4	2	0	0
Chester White, 4 "	2	1	0	1
Tamworth, 3 "	1	1	0	1
Duroc-Jersey, 6 "	2	0	4	0
Poland-China, 6 "	0	3	3	0

Notes.

1. Yorkshires have again taken the lead as to suitability for export. They were an especially good lot this year. They have a decided advantage in quality over other breeds in the average of five experiments.

2. Tamworths, for some unknown reason, did very badly this year. Only three out of the six were sent to the factory, and of these, one was too light to make "Wiltshire sides." In the average of five experiments, however, they would rank second in suitability for export.

3. Berkshires made a remarkably good showing this year, though the sides classed as "No. 1 selection" were faulted for shortness, and a common tendency for the fat to arch over the shoulder top. They did not make, therefore, ideal No. 1 sides, and were inferior to the Yorkshires in general suitability for export. In the five years' work, however, they easily rank third in quality.

4. Of the remaining breeds, it may be said that they have, on the whole, proved decidedly unsuitable for our export trade; and it would be difficult to decide which has the advantage in suitability for export, so far as the five tests are concerned.

Corn vs. Barley for Feeding Hogs.

The plan followed in this part of the experiment with pure bred hogs has already been described. Previous experiments have shown that it is bad practice to feed corn alone to hogs, so that in this experiment not more than three quarters by weight of the ration consisted of corn, the remainder consisting of wheat middlings. The same plan was followed with the barley. Owing to the difficulty mentioned in connection with the Chester Whites and Tamworths, these two breeds were not used in making the comparisons which follow. The period covered by this experiment extended from June 26th to November 13th, or 140 days.

Following is a statement of the gains, and meal consumed per 100 lbs. gain:

Group I. 12 Hogs. Corn and Middlings :

Average daily gain per hog .... .817 lb.

Meal consumed per 100 lbs. gain .... 432 lbs.

Group II. 12 Hogs. Barley and Middlings:

Average daily gain per hog .... .841 lb.

Meal consumed per 100 lbs. gain .... 430 lbs.

In this experiment, therefore, the mixture of barley and middlings gave slightly better esults in producing gain in weight, than the mixture of corn and middlings. The

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difference, however, is very small, and the two foods might almost be pronounced equal in feeding value, so far as this experiment goes. The influence of these foods upon the firmness of the bacon produced by them is reported in another place.

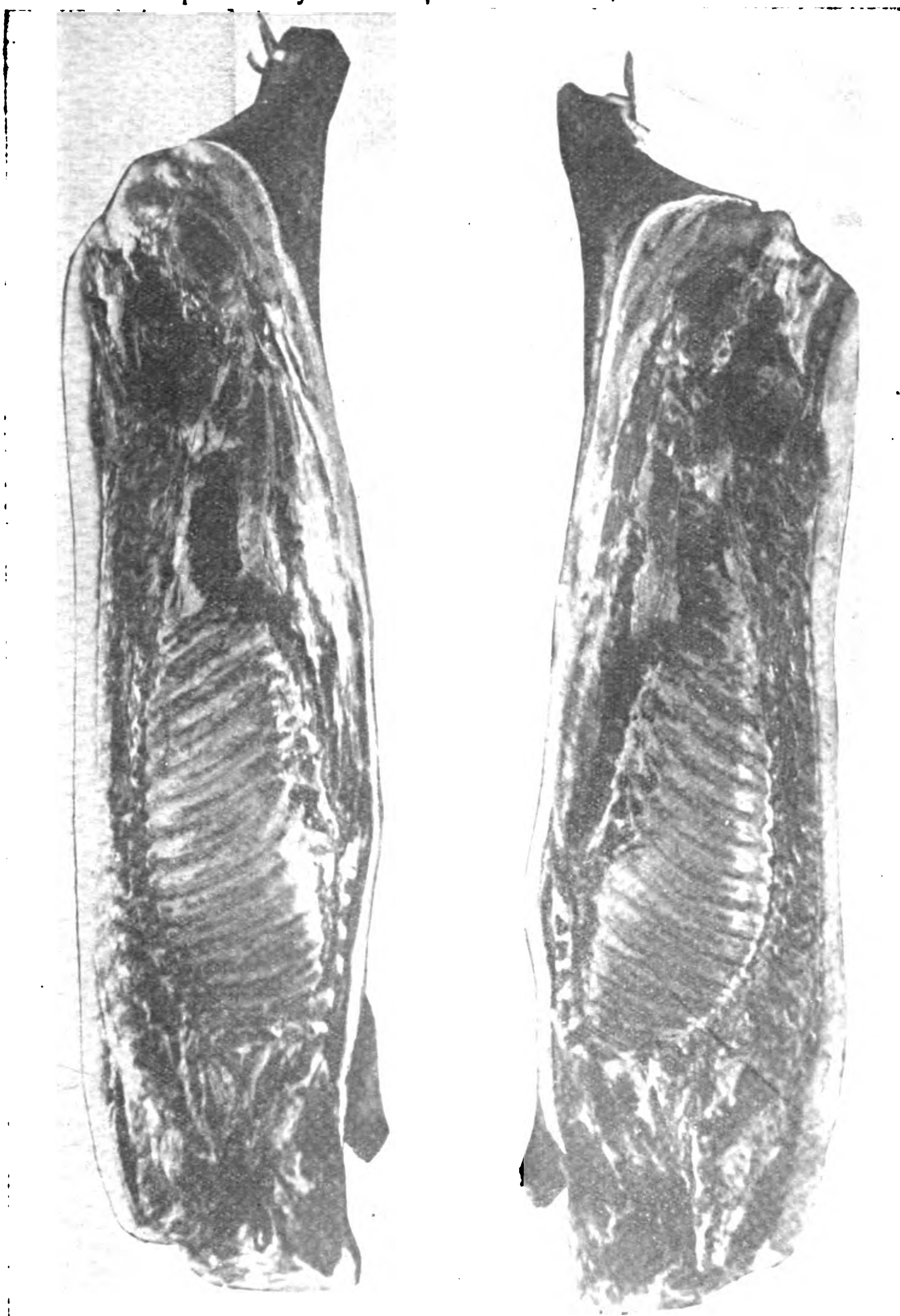

FIG. 1 represents a good "Wiltshire side," from one of the experimental hogs. Note the length between shoulder and ham, the evenness of fat along the back, and the lightness of shoulder.

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Experiments with Grade Swine.

Barley fed alone and in combination.—In previous experiments, barley has given very satisfactory results both as regards gains in weight and firmness of bacon. This experiment was conducted mainly to test still further the influence of barley upon the firmness of bacon, and this part of the experiment will be found reported under another heading. At present, only the rate and economy of gain will be dealt with.

The experiment lasted from February 12th to June 12th, or 120 days. Five hogs were used in each group, the average live weight of the hogs being about 54 lbs. each at the beginning of the experiment. During the first month, one-third of the meal ration consisted of wheat middlings. During the second month the middlings comprised only one-quarter of the meal ration. After the second month, no middlings were fed. The roots used were mangels. In the case of cooked roots, the roots were weighed before cooking, and calculations are based on these weights. The roots and meal were fed in nearly equal parts by weight, the meal slightly exceeding the roots.

The gains, and food consumed per 100 lbs. gain were as follows:

Group I. Barley:

Average daily gain per hog	.789 lb.
Meal consumed per 100 lbs. gain	458 lbs.

Group II. Barley and Corn, equal parts:

Average daily gain per hog	.762 lb.
Meal consumed per 100 lbs. gain	478 lbs.

Group III. Barley and Oats, equal parts:

Average daily gain per hog	.645 lb.
Meal consumed per 100 lbs. gain	526 lbs.

Group IV. Barley and Cooked Roots, equal parts:

Average daily gain per hog	.850 lb.
Meal consumed per 100 lbs. gain	397 lbs.
Roots " " "	361 lbs.

Group V. Barley and Raw Roots, equal parts:

Average daily gain per hog	.807 lb.
Meal consumed per 100 lbs. gain	423 lbs.
Roots " " "	374 lbs.

Summary.

1. Barley alone gave larger gains than when combined with either oats or corn.
2. Barley and roots gave larger gains than barley alone.
3. Cooked roots gave much better results than raw roots, but it is very probable that the individuality of the animals had more to do with causing this difference than the cooking of the roots.
4. In the case of cooked roots, one pound of grain proved equivalent to 5.9 lbs. of roots. This is not nearly so high a value as many people place upon roots for feeding hogs; but it corresponds very closely with the results of extensive Danish experiments.
5. A short experiment conducted under my direction by Mr. A. H. Crerar as a basis for his third year thesis, indicated that a pound of mixed grain is equivalent to 5.78 lbs. of raw roots. This is almost identical with the relation between cooked roots and barley stated above, and indicates that the comparison of cooked and raw roots is scarcely reliable.
6 Further experiments with roots are in progress, and it is too soon to draw conclusions.

Wet vs. Dry Meal.

This was a short experiment, lasting only seven weeks, conducted by Mr. G. H. Hutton in connection with his third year thesis. Four hogs were fed wet meal consist-

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ing of wheat and barley, and four other hogs of similar breeding were fed the same meal mixture dry.

The hogs receiving wet feed made an average daily gain per hog of .957 lb., and consumed 489.44 lbs. meal per 100 lbs. gain.

The hogs receiving dry feed made an average daily gain per hog of 1.037 lbs., and consumed 451.79 lbs. meal per 100 lbs. gain.

Owing to the demands upon our space for other work, this experiment has not been repeated. It is worthy of note, however, that the practice of feeding dry meal to hogs is growing in favor among swine breeders.

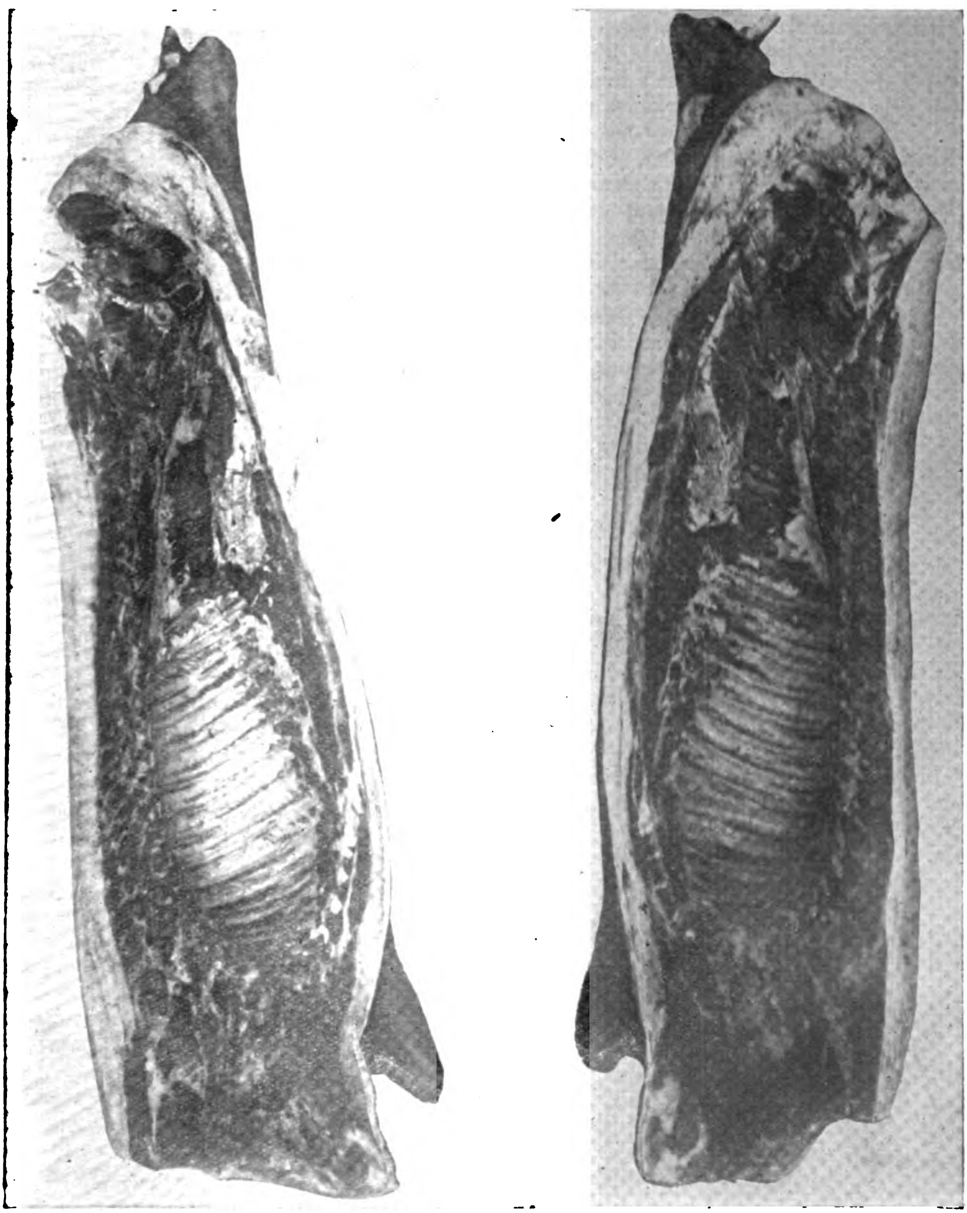

FIG. 2 shows a poor export type. It is short between shoulder and ham, carries too much fat along back, and is heavy at the shoulder and neck.

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Influence of Food upon Firmness of Bacon.

Feeding Roots Throughout Finishing Period.—For this experiment, eleven grade hogs in the farm piggery were used. They had been fed roots, the refuse from the College kitchen, and mixed meal until they weighed about 120 lbs., but the proportion of the different foods up to this period are not definitely known. From this time until they went away, a period of 61 days, they were fed all they would eat of a mixture composed of 50 lbs. mangels to 22 lbs. meal. The mangels were pulped and mixed with the meal a day in advance of feeding. The meal consisted of ground barley mixed with one-third of its weight of a mixture of bran and middlings.

At the close of the experiment the hogs were sent to the Wm. Davies Co., who reported that *the bacon came out of the salt in first-class condition as to firmness.*

Roots Discontinued Three Weeks before Shipping.—In this experiment five hogs were fed an exclusive meal ration; five others were fed the same meal ration with raw roots, and five more were fed the same meal ration with boiled roots. The experiment lasted 141 days, and the roots were fed during the whole time except the last three weeks, when they were discontinued, and all the groups fed the same ration. The meal ration consisted of barley and middlings at first, which was gradually changed to clear barley. The proportion of grain to middlings is described in the next experiment reported. The meal and roots were fed in about equal parts by weight, the weight of meal being slightly the greater on the whole.

These hogs were also sent to the Wm. Davies Co., and *all turned out firm.*

Influence of Barley and Corn, and Barley and Oats.—This experiment ran concurrently with the one just described, the same class of hogs, and the same sized groups being used. The meal ration was as follows: 31 days, two parts ground grain to one part middlings; 41 days, three parts ground grain to one part middlings; remainder of time, or 69 days, ground grain alone. The grain for one group consisted of equal parts of barley and corn, and for the other group, equal parts of barley and oats. The combination of grain with middlings was the same in the experiment previously described as it was in this one.

The bacon from the hogs in this experiment also turned out firm.

Barley and Middlings vs. Corn and Middlings.—We have had such uniformly good results from barley that we are being led to adopt it as a basis of comparison for other foods. On the other hand, we have had very bad results from corn when fed alone for any considerable length of time, both as regards gain in weight and quality of bacon. In this experiment, the corn was diluted with middlings and compared with barley similarly diluted. The hogs used were those used in the breed experiment, which has already been described. Three hogs of each breed were fed the corn mixture, and three of each breed, the barley mixture. The corn and barley were each mixed with middlings as follows: 24 days, one part grain to three parts middlings; 37 days, equal parts grain and middlings; remainder of time, or 79 days, three parts grain to one of middlings. On November 13th, fourteen of the hogs, seven out of each lot, were sent to the Wm. Davies Co. The remainder were not marketed until December 26th, so that we have not yet received a report upon their relative firmness.

Of the first consignment, *six of the seven hogs receiving the barley mixture were firm enough for No. 1 selection, and one was too tender. Of those receiving the corn mixture, not one was firm enough for No. 1 selection.*

Summary.—There were varying degrees of firmness in the hogs on the same ration, but this was probably due to the fact that they had a very limited amount of exercise from the start, and could scarcely be expected to be quite so firm as hogs which had more freedom in the earlier stages of growth.

1. Hogs which have had plenty of exercise and a mixed diet, or that have received a reasonable allowance of dairy by-products and a mixed grain ration, until they are over 100 lbs. live weight, can be finished on corn without injury to the quality of bacon.

2. Close confinement in pens from birth to time of marketing has a tendency to injure the quality of bacon, though the effect is not always well marked.

3. The rational use of dairy by products tends to produce bacon of excellent quality, and seems to compensate largely for lack of exercise.

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4. Unthrifty, unfinished hogs, or those which have been kept on a mere maintenance ration, to keep them from becoming too heavy while holding for a rise in prices or other reason, have a marked tendency to softness.

5. Exclusive corn feeding during a somewhat extended period has given very unsatisfactory gains, and has produced bacon of very soft, undesirable quality.

6. The mixing of middlings with corn, to the extent of two-thirds of the ration at the commencement and one third at the close of the feeding period, has not been successful in counteracting the bad effects of corn, the bacon thus produced being soft and generally undesirable.

7. Barley, to the extent of at least half the ration, seems to have an influence in mitigating the effect of corn, but further investigation is necessary along this line.

8. Barley, either alone or in conjunction with oats or middlings, has produced bacon of first-class quality.

9. Peas appear to have an influence similar to barley.

10. So far as our work has gone, roots have had no injurious effect upon the firmness of bacon; but they are being made the subject of further investigation.

Experiments With Sheep.

An experiment in fattening lambs on whole corn, ground corn, whole peas, ground peas, and mixed corn and peas, was conducted during the past winter; but the results are somewhat contradictory, and it has been thought advisable to withhold them until further work has been completed. A repetition of the experiment is now in progress.

FARM SUPERINTENDENCE.

Improvements.—The principal improvements during the year are as follows:

A closed shed, 25x56, was built adjoining the farm piggery. Our breeding sows are turned into the shed every day for exercise, and we hope to see beneficial results from this treatment when farrowing time comes.

A small, neat milk room was built adjoining the farm stables, in which the milk cans, etc., are kept during milking. By this means the milk is kept away from the dust and taint of the stables. A cement floor was put in the feed room of the farm stables.

A considerable portion of about 12 acres of swampy land was cleared About 7 acres were sown to rape this year, and we hope to have the whole plot cultivated next year.

A new 20 h. p. portable engine was purchased and a large wooden pulley connected with the rope drive was replaced by an iron one. We have now plenty of power, and practically no lost time through breakages.

Crops.

Rotation.—It is intended to follow practically the same rotation as that hitherto practised, viz.: two years hay and pasture; one year roots, corn, potatoes and peas; one year cereal crops—oats, wheat and barley—all seeded with clover and timothy. Rape sometimes comes in the same section as the roots, etc., and sometimes it replaces a portion of the second year's meadow. Other minor modifications may also occur.

Meadow.—We had nearly 100 acres in hay, which yielded about 2½ tons per acre. Our grass mixture this years consisted of red clover, 8 lbs.; alsike, 2 lbs.; timothy, 4 lbs. Of this mixture we sowed about 12 lbs per acre in front of the grain drill spouts, following the drill with a weeder to level the surface somewhat, and to leave the grass seed uniformly covered.

Oats.—Of oats, we sowed some 65 acres after corn, rape, roots and potatoes. They were sown April 24th to 28th, at the rate of rather less than 1½ bushels per acre; and harvesting commenced August 2nd. They were all of the Siberian variety, and produced an extremely heavy crop of straw. They will probably yield 60 bushels per acre.

Cultivation for Oats.—The preceding fall the corn roots were loosened with a narrow plow without a mouldboard. The ground was then well harrowed, and twice cultivated with a spring tooth cultivator, first with narrow points and then with broad points. Then the ground was ribbed up with a double mouldboard plow, and left in this condition

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for the winter. In the spring the ground was first harrowed and then cultivated across the ribs; then harrowed, sown, gone over with the weeder, and finally rolled after all the other seeding was completed. The rape was pastured until the ground was frozen, so that in the spring this ground was gang-plowed, harrowed, sown, etc. The root and potato ground, being very clean, was merely ribbed the preceding fall, and the spring cultivation was the same as that given the corn ground.

Barley.—Ten acres of Mandscheuri barley were grown. It was sown on ground which had grown oats the preceding year, but on which the clover had practically all perished. Clover and timothy were sown with the barley and made a good stand. The barley was sown April 21st at the rate of $1\frac{3}{4}$ bushels per acre; and harvesting commenced July 24th. Estimated yield, about 45 bushels per acre.

Cultivation for Barley.—The oat stubble was gang-plowed in the spring, thoroughly harrowed, sown, gone over with the weeder, and rolled as described for oats.

Peas—Prussian Blue peas were sown on $21\frac{1}{2}$ acres at the rate of about $2\frac{1}{2}$ bushels per acre. They were sown May 3rd and 5th, and the harvester was started August 14th. They were very heavy in the straw and well podded. They will yield 35 bushels per acre.

Cultivation for Peas.—During the preceding August the land was plowed out of sod. It was plowed about four inches deep and chains were used on the plows to turn under grass. The furrow slice was turned as nearly upside down as possible, and a heavy roller was passed over it, followed by a double stroke of a heavy, sharp harrow as soon as practicable after plowing. Later, it was gone over with the spring tooth cultivator with broad points. In the winter, manure was spread over the surface at the rate of from 12 to 15 loads per acre. The road to the fields, however, finally became impassable, and part of the field was not manured until just before the peas were sown. This delayed seeding somewhat, but meant a saving of time and soil moisture after harvest, which is extremely important when fall wheat is to follow the peas. The manure was gang-plowed in, going crosswise of the fall plowing. Thorough harrowing prepared the ground for the drill.

Winter Wheat.—Winter wheat comprised 5 acres of Dawson's Golden Chaff and 9 acres of Early Genesee Giant. It followed peas, and was sown during the first week of September at the rate of between five and 6 pecks per acre. Harvesting commenced July 21st, and the yield will be between 35 and 40 bushels per acre.

Cultivation for Winter Wheat.—Immediately after harvest the pea ground was gang-plowed, harrowed, rolled, and left lying to accumulate moisture until time for sowing. The spring-tooth cultivator followed by the harrow prepared the seed bed.

Potatoes.—The potatoes occupied $7\frac{1}{2}$ acres, and were mostly Empire State, the remainder being Rose of Erin. They followed sod, and were planted May 29th to June 2nd, in drills 30 inches apart. They were on about the poorest land on the farm, and the extreme heat and drouth of August almost ruined the crop. The yield was less than 100 bushels per acre.

Cultivation for Potatoes.—Fall cultivation the same as for peas. Manure was spread on the surface during the winter at the rate of about 15 loads per acre. In the spring the land was plowed about 5 inches deep with a two furrow plow, harrowed, and rolled. Before planting, the land was ribbed up with a double mouldboard plow. The potatoes were planted between the ribs, the ribs split with the ribbing plow, and then harrowed nearly level. Later, the weeder was used to loosen the surface, and afterwards, the one horse cultivator (scuffler) was used between the drills at intervals.

Mangels.—This year we grew Thorp's Champion Yellow Intermediate, of which we sowed 10 acres. They were sown May 12th to 15th, on low ridges 30 inches apart, at the rate of 4 lbs. of seed per acre. The germination and early growth were all that could be desired; but August and September very seriously injured the crop.

Cultivation for Mangels.—Fall cultivation, manuring, and spring cultivation were practically the same as for potatoes, the mangel ground being the first thing attended to after seeding. We attempted to use the grubber to loosen the lower soil, but were forced to desist owing to the gravelly nature of much of the subsoil. After sowing, the land roller was run over the drills. The mangels were thinned to from 12 to 14 inches apart. The scuffler was used at intervals to keep down weeds and loosen the surface soil.

Turnips.—Of turnips, we sowed $7\frac{1}{2}$ acres of Hartley's Bronze Top. They were sown June 16th and 18th on low ridges, 28 inches apart, at the rate of about 2 lbs. of

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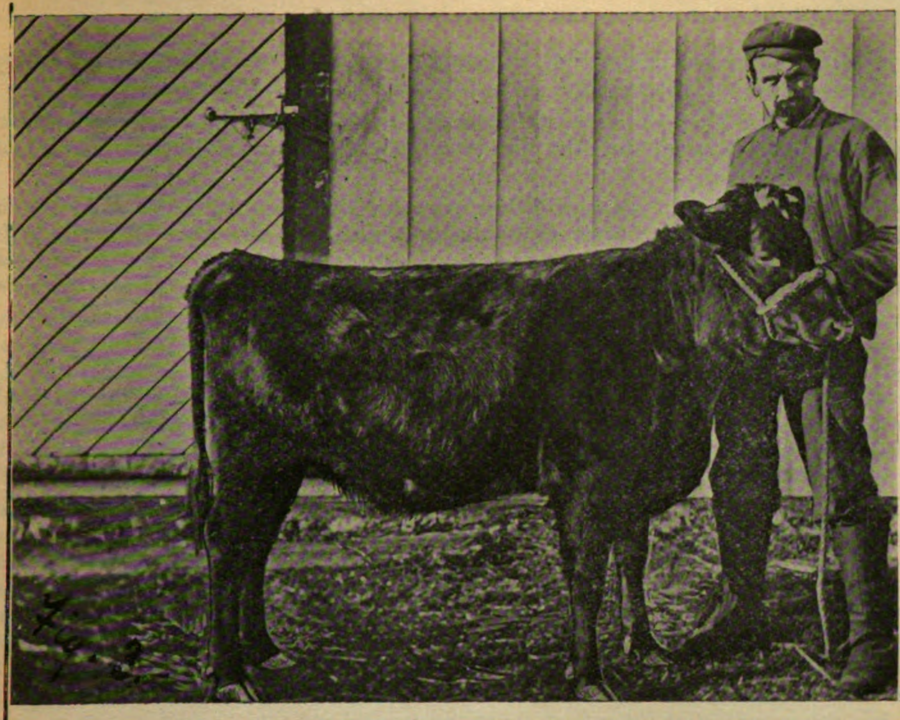

FIG. 3.—Shorthorn heifer, College Beauty. Bred by Ont. Agr. College.

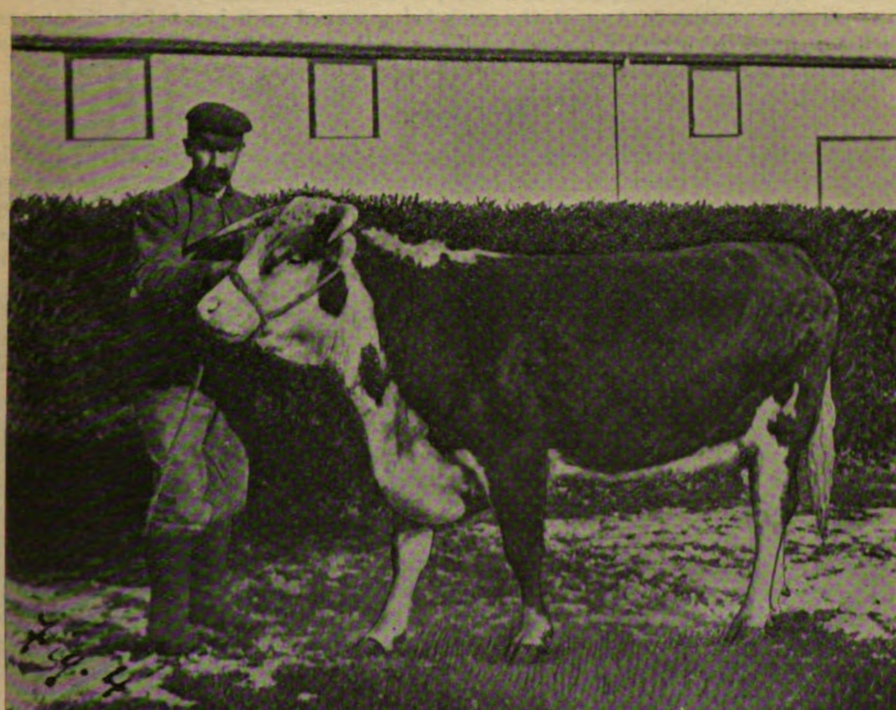

FIG. 4.—Hereford heifer, College Nymph, 82939. Bred by Ont. Agr. College.

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seed per acre. They germinated well, and their early growth was satisfactory; but they suffered along with the potatoes and mangels during August and September.

Cultivation for Turnips.—The cultivation and manuring were the same as for mangels, except that, before sowing, the land was twice cultivated, which thoroughly mixed the manure with the soil.

Corn.—We sowed 33 acres of fodder corn for the silos—25 acres of Wisconsin Earliest White Dent, and 8 acres of Mammoth Cuban. It was sown with the grain drill in rows 42 inches apart, and was harvested September 14th to 24th. It was well advanced towards maturity, and made excellent silage. The yield was 14 tons per acre.

Cultivation for Corn.—The corn also followed sod, and the fall cultivation was the same as for potatoes, except that manure was applied during the fall, and the land was ribbed with the double mouldboard plow. The spring cultivation was practically the same as described under oats After sowing, the weeder was used at intervals to break the crust, and when the corn was well up, the two horse cultivator was started. The cultivator was practically kept going until the corn was between three and four feet high, after which the one horse cultivator was used.

Rape.—Six acres of rape were sown after sod, 9 acres after oats which had been seeded with clover the previous year (but which turned out to be so badly infested with white cockle that it was thought advisable to plow it under), and about 7 acres on some newly cleared land. The six acres were sown on May 26th and 28th, and the remainder on June 27th and 29th. The early sowing was ready to pasture by the first of August, and the other by the latter part of September. It was pastured by steers and lambs, and afforded a large amount of valuable food. Where practicable, we prefer to sow rape in drills, 26 inches apart, and to use very little over a pound of seed per acre. It may, however, be sown broadcast at the rate of about two pounds per acre.

Millet.—Ten acres of millet were sown on another part of the oat stubble previously mentioned. It was sown June 23rd and 25th, at the rate of about 40 lbs. per acre. It afforded very fair pasture in August, the stock being turned on it just before it came into head; but it imparted a rather unpleasant flavor to the milk of the cows pastured upon it, which was a serious objection.

Live Stock.

An effort has been made to improve the stock so far as means will admit, and culling has been severe in some cases. A liberal expenditure of money will, however, be necessary to bring our stock up to the standard it should attain; but by judicious management, the expenditure in any one year need not be excessive. Animal husbandry is the most important branch of Agriculture in Ontario, and we should place high ideals before our students. It is impossible to give students an adequate idea of correct type, unless we have that type available for study. I feel, therefore, that this department should be most liberally dealt with; and the judicious expenditure of a few thousand dollars in high class stock would unquestionably result in widespread, permanent good to the live stock industry of our Province.

Bulls.—Of bulls, we have one each of the following breeds; Shorthorn, Aberdeen-Angus, Hereford, Holstein, Ayrshire, and Jersey. We are badly in need of a new Shorthorn, and will soon have to replace our Hereford.

Feeding bulls—Our bulls receive cut hay and a limited amount of roots, about 15 lbs. each per day. In addition, they receive a light meal ration, varying in quantity according to condition and amount of service. The usual quantity of meal fed is from 5 to 6 lbs. each per day. The meal rations consists of about four parts ground oats to one of bran. The amount of hay is restricted, as some of the bulls will eat more than is good for them, if allowed all they will take. This method of feeding has given very good results during the year, our bulls being active and reasonably sure, and carrying sufficient flesh for breeding animals.

Beef Breeds of Cows and Calves.—Our Shorthorns have been strengthened by the purchase of two good yearling heifers from Mr. A. W. Smith, Maple Lodge, Ont. The different breeds are represented as follows:—Shorthorns, two cows, two yearling heifers, one

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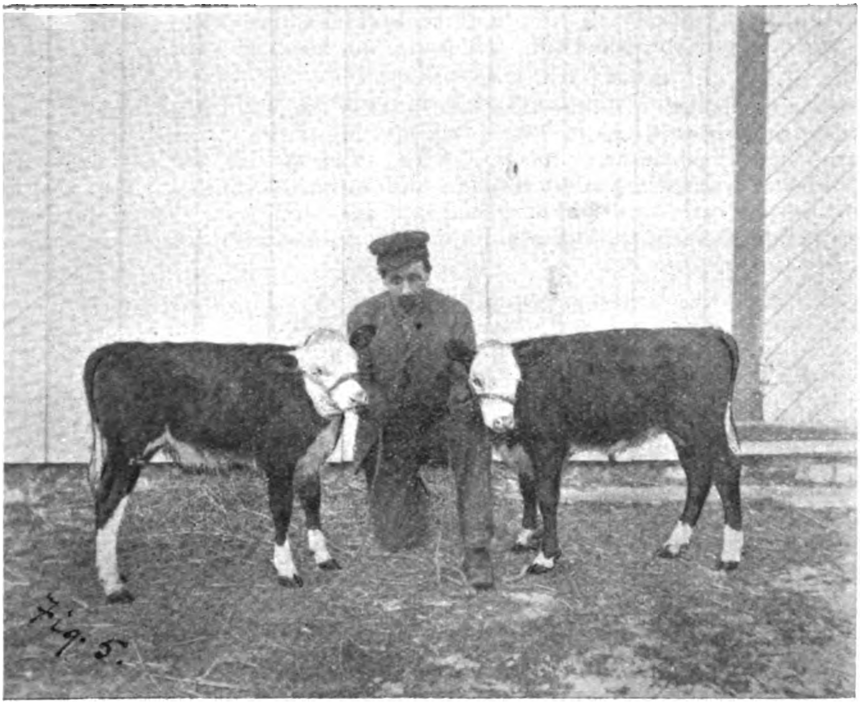

Fig. 5.—Hereford twin heifer calves, College Fairy and College Fay. Bred by Ont. Agr. College.

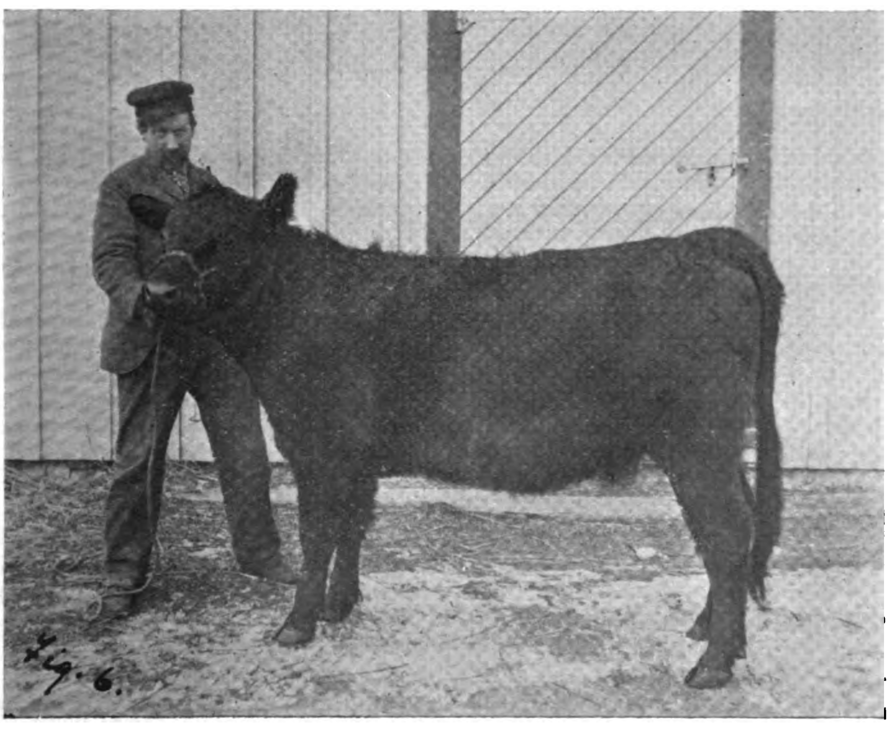

Fig. 6.—Galloway heifer, College Bess, 15118. Bred by Ont. Agr. College.

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heifer calf and one bull calf; Herefords, three cows and four heifer calves; Aberdeen-Angus, two cows and one heifer calf; Galloways, one cow, one yearling heifer and one bull calf.

Feeding Beef Breeds of Cows.—The bulky part of the ration consists of cut hay and chaff, silage and roots. These fodders are mixed a day or two in advance of feeding in about the following proportions: Silage, 375 lbs; roots, 240 lbs, and hay and chaff, 60 lbs. Cows that are suckling calves receive a meal ration in addition. The meal ration preferred is equal parts by weight of ground oats, peas and bran, though circumstances sometimes cause variations. The meal ration seldom exceeds 6 lbs. each per day, while dry cows receive no meal.

Milch Cows.—One herd at present comprises 12 head,—three Holsteins, one Ayrshire, and eight grades. There has been some buying and selling during the year, but the twelve cows we have on hand have been milking, on an average, 255 days during the year, and their average milk yield is 6,350 lbs. each. The best yearly record is 11,458 lbs. Other yearly records are 9,957 lbs., 9,890 lbs., 9,215 lbs., 8,411 lbs., 7.285 lbs. and 5,832 lbs. The remaining cows have not yet completed their milking period.

Feeding Milch Cows.—The milch cows receive the same kind of bulky food and meal as the beef breeds of cows, but their meal ration runs from 6 to 9 lbs. each per day, depending on their yield of milk. Dry cows, except those that are intended for the butcher, receive no meal.

Steers.—Sixteen steers were purchased in the fall of 1899, and sold after feeding six months.

Cost of steers, 19,350 lbs. @ $4.20	$ 813 70
Sold at end of six months, 23,560 lbs. at $5 10	1201 56
Difference	$ 387 86
Less value of feed	300 00
Profit	$ 87 86

Values attached to foods, hay and chaff mixed, $4.00; silage, $1.50; roots, $2.00, and meal, $15.00 per ton.

Owing to a misunderstanding, these steers suffered an unduly severe shrinkage when sold.

In August, 23 head of very thin steers were bought at a cost of $839.00. In December, 14 head of the poorest quality were sold to the butcher for $570.00, and the remaining nine, with four others subsequently purchased, are still on hand. It is intended to replace at least a part of those sold.

Feeding Steers.—The method of feeding the 16 steers sold last spring is outlined in my last report.

The steers purchased in August were pastured on rape until the early part of November. They were taken in at night and fed what they could eat of a mixture of silage and hay before they went out in the morning. In October, they received about 2 lbs. of meal each per day; in November, 3½ lbs.; in December, 4½, and in January they will receive 6 lbs. This quantity will likely be increased to 8 or 9 lbs during the last two months of feeding. They receive the same bulky fodders as the rest of the cattle.

Sheep.—As stated in last year's report, our sheep have been considerably reduced in numbers, and represent only four breeds,—Shropshires, Oxfords, Leicesters and Cotswolds. In addition to the pure-breds, we are feeding 100 grade lambs, which were purchased in October, pastured on rape as long as the weather permitted, and then taken into the pens. We expect to market these lambs in February.

Feeding Sheep.—Our method of feeding our breeding flock is practically the same as described in last year's report. The grade lambs are receiving what they will eat of mixed timothy and clover hay, about 3½ lbs. each of mixed roots and silage, and 1½ lbs. each of equal parts by weight of whole oats and peas per day. The lambs were started on a little

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less than 1 lb. of grain each per day, and required about 6 weeks to reach full feed (1½ lbs).

Swine.—Our swine comprise representatives of the Yorkshire, Tamworth and Berkshire breeds. This is quite as many breeds as we can handle to advantage. Representatives of the Chester White, Duroc Jersey and Poland China breeds have been fed in the experimental piggery.

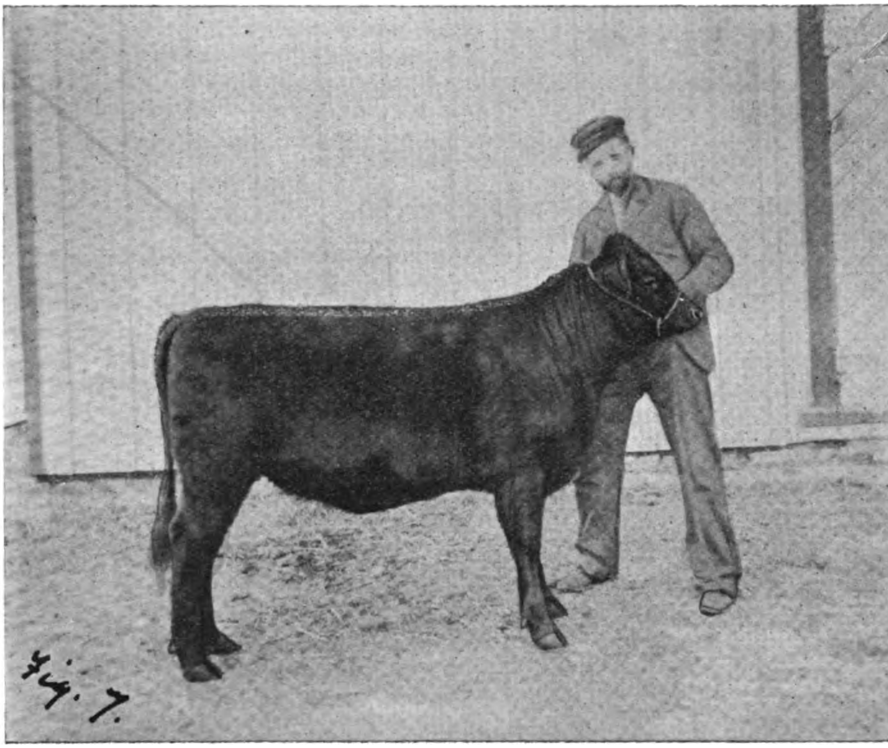

Fig. 7.—Aberdeen-Angus heifer, College Rose, 38883. Bred by Ont. Agr. College.

Feeding Swine.—Breeding sows are fed sparingly on a mixed meal ration consisting generally of ground oats, barley and peas, the oats constituting about half the mixture. In addition, they receive a fairly liberal allowance of pulped roots, which is decreased as farrowing time approaches. Before feeding, they are given a drink of water, and then the meal is fed dry on top of the pulped roots. Sometimes the meal and pulped roots are mixed a day in advance of feeding, but either plan seems to work well.

Growing pigs, four months old and over, receive the same meal mixture as the sows, but in the place of roots, they are fed the refuse from the college kitchen. The meal is fed dry to these also.

Small pigs are fed about equal parts of finely ground oats and middlings, together with skim milk when such is available. In this case the meal is moistened with the milk. They are also accustomed to eating roots, mangels preferred.

Our sows are turned into a large shed adjoining the piggery, for a few hours every afternoon. A very little whole grain of some sort is scattered broadcast over the floor of the shed to induce the sows to take exercise.

Financial Statement of Farm Department.

As explained in last year's report, I believe it is impossible to make the Farm department educational in the highest degree, and at the same time show a satisfactory

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dividend. In the following statement the farm has been credited with produce, etc., supplied to other departments, for which it receives no cash revenue.

Dr.	$ c.	Cr.	$ c.
To Inventory of Live Stock, Jan. 1, 1900.		By Inventory of Live Stock, Jan. 1, 1901	
Cattle	3,316 80	Cattle	3,775 00
Sheep	585 45	Sheep	886 00
Swine	805 00	Swine	635 00
Horses	685 00	Horses	616 50
" Permanent improvements	215 99	By sales of cattle	2,449 41
" Wages	3 109 19	" swine	1,286 61
" Purchase of stock	2,510 00	" sheep	384 35
" Maintenance of stock	625 00	" wheat	238 40
" Seeds	190 61	" oats	25 25
" Binding twine	31 25	" potatoes	4 30
" Repairs, etc	400 00	" milk	156 58
" Furnishings	75 24	" wool	32 35
" Fuel and light	30 00	" hides and skins	14 32
" Printing, postage	15 00	" old fence	9 00
" Contingencies	125 00	By pasture of lambs on surplus rape	10 00
" Implements	221 80	" Service fees for male animals	127 50
" Portable engine, 10 % of $825.00	82 50	" *Dairy and Exp. Feeding Department*:	
		2,420 bush. roots (mangels and turnips) at 7c	169 40
		70 tons hay at $6 00	420 00
		250 tons silage at $2.00	500 00
		Pasturing 30 cattle 5 months at $2 00 per month	300 00
		Service of bulls	41 00
		" *College*:	
		56,442 lbs. milk at 80c. per cwt	451 53
		220 bags potatoes at 40c	88 00
		Keep of 2 horses at $75.00 each per year	150 00
		Work of horse drawing sewage	50 00
		" *Experimental Department*:	
		Keep of 5 horses at $75 00 each per year	375 00
		" *Garden Department*:	
		Keep of 2 horses at $75 00 per year	150 00
		" Labor in various departments, including Winter Fair building:	
		60 days for man and team at $2.50 per day	150 00
		" Loss on live stock through keeping many different breeds for educational purposes	
To balance	851 67		400 00
	13,895 50		13,895 50

In order to keep a complete and satisfactory set of books for the Farm Department, a special book-keeper would be necessary. The statement given above conveys a general idea of the standing of the department, but there are some items that are difficult to estimate. The inventories are very conservative, and I feel sure that if the stock were sold at auction to-day, it would sell for considerably more than the estimated value. The estimate of $400 as compensation for loss on live stock through keeping so many breeds, is a very modest one. It is impossible to say just what this loss amounts to, but any stock-breeder knows that practically no money can be made by keeping only two or three representatives of each of a large number of breeds. The balance of $851.67 looks small, but it is surprising that there should be a balance at all on the right side of the ledger, under existing circumstances.

I have the honor to be,

Your obedient servant,

G. E. DAY,

Professor of Agriculture.

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PART IX.

REPORT OF THE PROFESSOR OF HORTICULTURE.

To the President of the Ontario Agricultural College:

Sir,—I have the honor to submit herewith a brief report upon the work done in the Horticultural Department for the year 1900.

The scope of the work in this department has greatly enlarged during the past few years, and the progress made this year has been on the whole quite satisfactory.

INSTRUCTION.

At an institution of this kind, the work is naturally both of an educational and experimental character. The instruction of students and the conducting of experiments affording information to the general public are the lines along which our efforts have been directed. While trying to develop both of these features of the work as rapidly as possible, we have endeavored from the first to make the two go hand in hand, so that our students may have every opportunity of becoming familiar not only with the theory but with the practice of horticulture in all its branches.

Full courses of lectures as outlined in the College Circular were given to the students of the first, second, and third years, and the studies taken up in the class-room were supplemented as much as possible by demonstration and practical work in the orchards and fruit plantation, on the lawn, and in the garden and greenhouses. Most of the students have shown a keen interest in the work and have made good progress.

EXPERIMENTAL WORK

The regular work of the department, apart from that of teaching, includes the care and management of the orchards and fruit plantations, the vegetable and flower gardens, the arboretum, and forestry plantations, and the conservatory and greenhouses. In several of these branches of the work experiments have been in progress for several years, and much valuable information has been obtained, particularly upon variety tests with small fruits. Only brief summaries of these are here given, but we hope to be able before long to report on some of them more fully in bulletin form.

THE ORCHARD.

There was a good crop of apples this year on most of our trees of a bearing age. Such varieties as Duchess, Wealthy, Fameuse, and Northern Spy were particularly well loaded. By repeated sprayings the apple scab and injurious insects were held well in check. The most difficult insect we have found to fight is the codling moth in its second brood. These have always been more or less troublesome in spite of systematic and thorough spraying. Banding of the trees will be tried next year in addition to the spraying, and it is hoped it may be more effectively controlled in that way.

In the young orchard planted out in 1897, which is made up of a large number of varieties of apples, pears, plums, and cherries, most of the trees have made a good growth, although a few varieties of pears, plums, and sweet cherries begin to show signs of being too tender for this climate. This is hardly to be wondered at, however, when we remember the trying conditions to which trees were subjected during the winter of 1898 and 1899, when the weather was extremely cold for a long time, and there was little or no snow on the ground for root protection.

RASPBERRIES.

In the spring of 1899 a large new plantation of raspberries was set out, containing about 60 varieties. This plantation has made a remarkably fine growth, and should be in full bearing next year. Quite a number of the most productive varieties fruited

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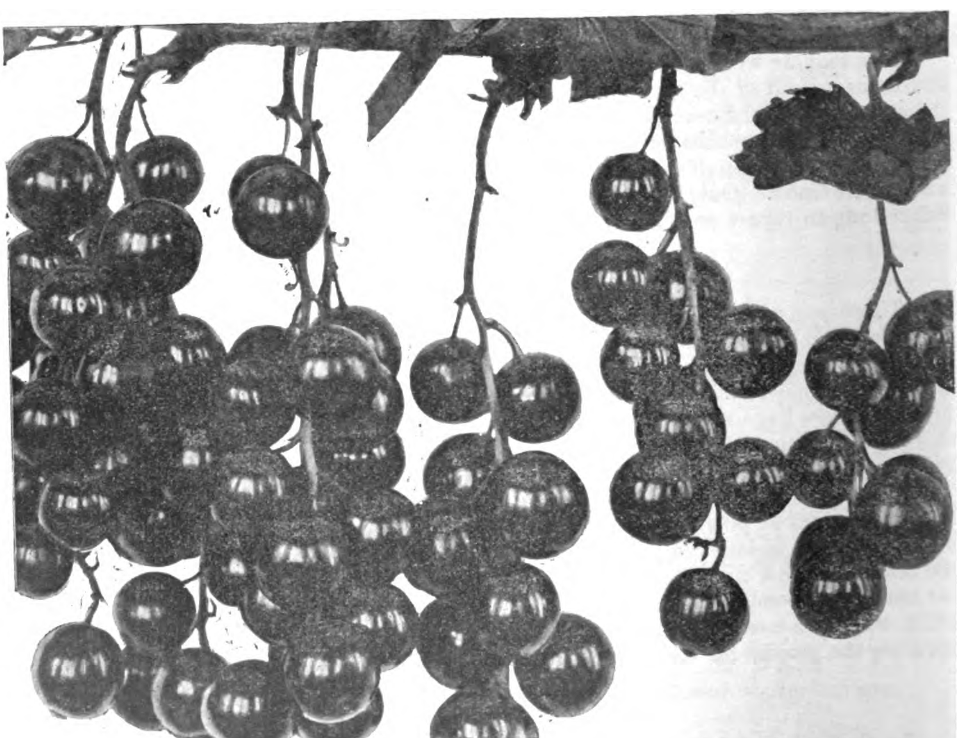
Gooseberry.—Pearl.



Red Currant.—Fay's Prolific.

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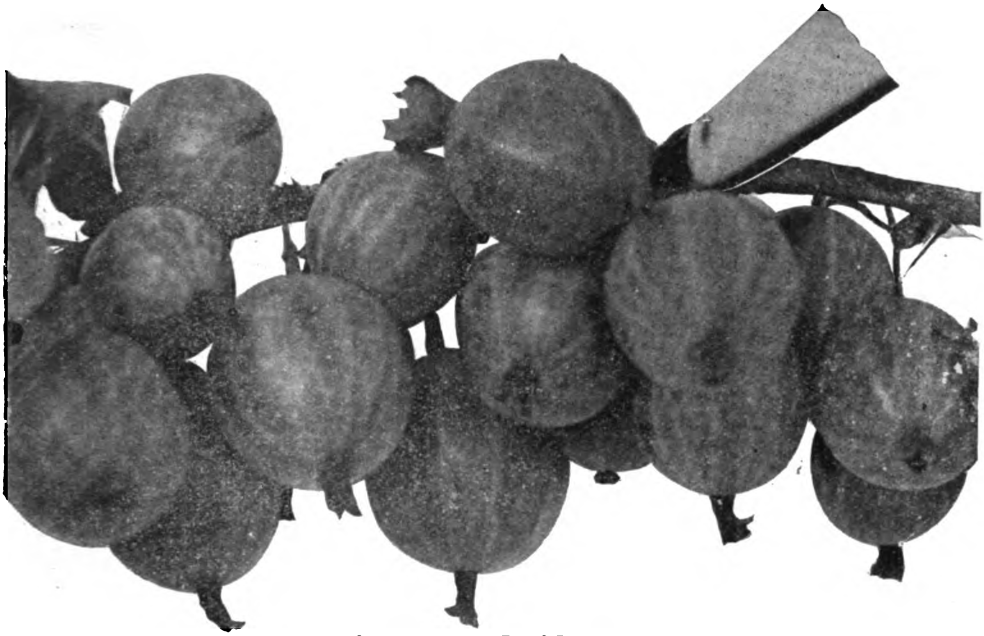

Gooseberry.—Red Jacket.

White Currant.—White Grape variety.

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heavily this year, and a record was made of their yields, but it has been thought best not to report upon these till next year, when all varieties will be nicely in bearing.

In an older plantation, containing thirty-nine varieties, an accurate account of the yields has been taken for the past four years. Among the eighteen red, yellow, and purple varieties, the following are the first half dozen on the list, ranked in the order of their yields for the four years: Shaffer, Cuthbert, Marlboro, Columbian, Loudon, and Royal Church.

Shaffer and *Columbian* belong to the purple cane family and are somewhat alike in being extra strong, vigorous growers, producing dull red or purple berries. The fruit is excellent for home use, but it does not sell so well as the bright red fruit of Marlboro and Cuthbert.

Marlboro and *Cuthbert* are two of the best red raspberries yet introduced. They are hardy and productive, and the fruit is large and showy in the market. Marlboro begins fruiting about ten days earlier than Cuthbert, and between the two they keep up a good supply of fine fruit for about a month.

Loudon and *Royal Church* are newer varieties of some promise, but it is doubtful if they will ever take the place of the old standards already mentioned.

Golden Queen is the best of the yellow fruited varieties, and is a desirable kind for home use, but it will not sell in the market with the bright-red varieties. Golden Queen has broken the record this year by outyielding all other varieties. but for an average of of the four years' fruiting it stands ninth on the list.

Black Raspberries.

Among the twenty-one varieties of black raspberries under test, there has been a lively competition for first place during the past four years. The following table shows those varieties that have ranked nearest the top of the list during that time:

Rank.	1897.	1898.	1899.	1900.
1st	Palmer	Mammoth Cluster	Older	Hilborn.
2nd	Souhegan	Older	Gault	Palmer.
3rd	Older	Gregg	Eureka	Kansas.

In this short table it will be seen that the names of nine varieties appear, but when an average of the yields for the four years is taken into account, the varieties rank in the following order: Older, Palmer, Mammoth Cluster, Hilborn, Gault, Souhegan, Gregg, Eureka, and Kansas. There are, however, other things to be taken into account besides amount of yield, and when both quantity and quality are considered we would mention the following as a few of the most desirable:

Older.—This is one of the most vigorous and hardy varieties. During the severe winter of 1898 and 1899 it leafed out fresh and strong to the tips of the canes, while Gregg and others were more or less severely injured. The berries are large and very black, without bloom, juicy and of good quality, but only moderately firm.

Palmer is an excellent early variety which is taking the place of Souhegan, being more productive and having a larger and finer berry.

Hilborn is a hardy, productive variety that has succeeded well in most parts of the country, but its fruit is smaller and less juicy than that of the Older or Palmer.

Gault and Kansas are two of the newer varieties that have made good records during the past two seasons. They both bear large, fine, firm berries

Smith's Giant is a promising new variety which fruited for the first time with us last year. It is very late, and may be valuable to lengthen the berry season. The fruit is very large, firm, and handsome.

Blackberries.

Blackberries, or thimbleberries, as they are often called, are the least hardy of the bush fruits grown in Ontario. They are grown extensively in the southern parts of the

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Province, but only to a limited extent in the interior and northern sections. They have usually been considered too tender for sections having such a climate as we have here at Guelph. There is, however, a great difference in the hardiness of the different varieties, as we have found by tests carried on here during the past four or five years. Twelve varieties have been tried, and eight of these have been fruited for three years. Agawam, Stone's Hardy, and Western Triumph have so far proven to be the most hardy, and taking an average of the three years' crop they rank in the order named for productiveness.

CURRANTS.

A new plantation of currants was set out this fall, containing forty-six varieties—three white, twenty-one black, and twenty-two red, in all about seven hundred bushes. These were all propagated in our own nursery from cuttings obtained from various sources all over the Province. Among them are some promising seedlings of Ontario origin, and a number of Dr. Saunders' seedling black varieties. From this plantation we hope to obtain some interesting results in the course of a few years.

In an older plantation, thirteen varieties have been fruited during the past four years. White Grape still heads the list, not only as the best white currant, but as the heaviest yielder among all its varieties.

Among the three black varieties—Champion, Naples, and Lee's Prolific—there is but little room for choice, although Champion has on the whole made the best record.

The most productive red currants, ranked in the order of their yields for the past four years, are Victoria, North Star, Fay's Prolific, Raby Castle, Prince Albert, La Versailles, Belle de St. Giles, and Cherry. But when both yield and size of berries are taken into account, the best varieties have been Victoria and Fay's Prolific. Belle de St. Giles produces very large handsome berries in long bunches, but so far it has not equalled Fay's Prolific for productiveness.

GOOSEBERRIES.

A new plantation of about three hundred and fifty bushes of gooseberries was set out this fall, containing forty varieties. In this collection are a number of Dr. Saunders' new hybrids between the English and American types. In Pearl and Red Jacket, Dr. Saunders has already given us two of the best varieties grown in Ontario, and we will watch with interest the results from these new crosses.

During the past four years we have been testing thirteen of the varieties most commonly grown in this country, six of them American and seven of them English varieties. With us, the latter have always been more or less seriously affected with mildew, while the American varieties have always been quite free from it.

In an average of the four year's crop, Pearl is still at the head of the list for total yield. Downing, which closely resembles Pearl, comes second, Houghton ranks third, and Red Jacket fourth. Red Jacket produces the largest and finest fruit of the four, and is well entitled to a place in any collection.

STRAWBERRIES.

Two hundred and sixty varieties of strawberries have been under test here during the past five years. Careful notes have been taken upon the habit of the plants and the character of the fruit of each variety, and every picking has been carefully weighed and recorded. This has required a great deal of close attention and careful work, but it has put us in the position of knowing definitely just what each variety has done, and we can speak with some assurance upon the relative values of varieties which have been subjected to a test of this kind for five years in succession.

In arriving at a conclusion as to which are really the best varieties of strawberries, there are quite a number of points besides productiveness to be taken into account. With reference to the plant, we must consider its vigor and freedom from disease, its ability to reproduce itself by good strong runners, its ability to fertilize its own blossoms or those of other varieties, and also its season of bloom and fruiting. With reference to the qualities of the fruit, note must be taken of the size, shape, smoothness, and color of the berries, and also of the firmness and flavor of the

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flesh. Flavor is one of the least variable qualities in the strawberry, and is usually least considered. The qualities most sought in a market variety are large size, smooth round shape, and firmness of flesh. The colour may vary from a bright red to a dark crimson. but a dark rich colour, enlivened by bright yellow seeds and a varnished appearance, makes a variety not only attractive in the market but the most desirable for canning.

Notwithstanding all the many varieties that have been tried, we are still looking for the ideal strawberry. There are among those tried many excellent ones, but even the best are wanting in one or more desirable qualities. In the brief summary here necessary, we can name only a few of the leading varieties, mentioning their most prominent good qualities and defects.

In making a selection of varieties, either for home use or market, we do not think it is well for a grower to restrict himself to less than half a dozen kinds. He is then more certain of having both quantity and quality, no matter what the soil or season. Such a collection should include not only a few of the best mid-season varieties, which are usually the most productive, but a few of the best early and late kinds, that the fruiting season may be extended as much as possible.

Among the *early varieties* some of the most desirable kinds are Sadie, Anna Kennedy, and Van Deman.

Van Deman is in many respects an ideal berry. It is very early, of uniformly good size, smooth, roundish conical shape, firm flesh, and a very handsome dark crimson color, with bright yellow seeds and a varnished appearance. The plant, however, lacks vigor, and requires a moist soil and favorable season to do its best. For three years in succession this proved to be our most productive very early variety; but during the last two seasons it has been surpassed by Sadie and Anna Kennedy. It is a perfect flowered variety, and an excellent pollenizer for other early pistillates.

Sadie is a newer variety that has made an excellent record for the three seasons it has been under test. It excels in vigor and productiveness, just those qualities in which Van Deman is lacking. It is also very early and a good pollenizer, but the berries are rather small, although shapely, firm, and of a good color.

Anna Kennedy is also a new variety, producing firm-fleshed, good-sized, very handsome berries of a dark crimson color. All it requires is the productiveness of Sadie to make it an ideal variety. It is a pistillate variety, requiring an early blooming bisexual variety, such as Sadie or Van Deman, near at hand to furnish the necessary pollen.

When both quantity and quality of fruit are considered we would mention Clyde, Irene, Warfield, Tennessee Prolific, and Jocunda Improved among the best *midseason varieties*.

Clyde comes nearest to the ideal variety in everything but the color of the fruit, which is hardly dark enough. For the three years Clyde has been fruited here it easily ranks first for productiveness. The plant is vigorous and healthy, the flower perfect, and the fruit large, shapely, and moderately firm.

Irene has now fruited with us three years, and it has proven to be well worthy of a place in any collection. The plant is vigorous and healthy, and makes plenty of runners. The blossoms are pistillate. The fruit is of fairly good size, shapely, and of a dark crimson color and handsome appearance. Last year this variety ranked first for total yield, but on an average of three years' crop it does not equal Clyde.

Warfield is an old standard that has had its ups and downs. In showery seasons it makes a grand yield; but in times of drouth its leaves curl up and the plants wither in the sun. It is an excessive plant maker, and throws out too many runners. The flowers are pistillate, the fruit is of medium size, shapely, firm, and of the dark rich color so much desired for canning.

Tennessee Prolific is a vigorous grower, and makes plenty of plants. The flowers are perfect, and the fruit is large, shapely, firm and of a bright color. This is a reliable variety that has on the whole made a good record, ranking near the head of the list among those varieties that have been fruited for five years in succession.

Jocunda Improved. If yields only were considered this variety would hardly appear in so short a list, although on the average of five years' crop it has made a very fair showing. In everything but yield, however, it ranks among the best. The plants are healthy and make just runners enough to fill the rows nicely. The flowers are perfect, and the fruit is large, shapely, firm, of a dark crimson color and very attractive.

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Among the *late* varieties, *Saunders* is still entitled to first place. In both plant and fruit it possesses as many of the good qualities and as few of the defects as any other variety on the list. The plants are healthy and vigorous and the flowers perfect. The berries are large, well shaped, firm and of good color.

TOMATOES.

During the past three years we have been conducting a variety test of tomatoes in which forty varieties were included. Careful notes have been taken upon the important characteristics of each variety, and records have been made at each picking of the weight of sound ripe fruit and rotten fruit, and account has also been taken of the amount of green fruit left on the vines at the end of the season. This has furnished some interesting and valuable data.

In regard to the amount of unripe fruit at the end of the season, there was not a marked difference in the different varieties, very few of them having more than two or three pounds per plant.

In the amount of rotten fruit there was a much more marked difference. Some varieties, such as Earliest of All, Express, Plentiful and Atlantic Prize showed very little or no rot, while some others, such as Livingstone's Favorite, Ignotum, Paragon and Volunteer lost from one-third to nearly one-half of their crop. The rotting could no doubt have been largely prevented by spraying with the Bordeaux mixture, but this was not done in order to ascertain the susceptibility of the different varieties to the disease, and the results show that there is quite a marked difference in varieties in this respect.

The varieties that stand at the head of the list this year for total yield of sound, ripe fruit are Earliest of All, Plentiful, Express, Atlantic Prize and Ignotum. The first three were practically alike as far as productiveness is concerned, each yielding about eleven pounds of ripe fruit per plant. In the following descriptive notes, the strong and weak points of such of these varieties are mentioned:

Earliest of All, as its name indicates, is one of the earliest to ripen. It is also very productive, and has so far proved quite free from rot. The fruit is of fair size and of a bright red color, but it lacks somewhat in smoothness and firmness.

Plentiful is a promising new variety, introduced last year by Wm. Rennie, Toronto. It is apparently very productive, and free from rot. It is of good size, has a smooth, pink skin, and is firm fleshed. It is not one of the early kinds, but will likely prove valuable for main crop.

Express is also a new variety from A. E. Sherrington, Walkerton, who has been developing it by the careful selection of his own seed for the past ten years. In our experiments this year, it ranged as one of the earliest and most productive, and had little or no rot. The fruit is medium size, smooth and firm.

Atlantic Prize is an old variety, well known as the standard for earliness. In the average of three years' tests, it ranks as one of the best, although in this year's test it has been surpassed both in earliness and productiveness by the varieties mentioned above.

ORNAMENTALS.

The tests with geraniums, coleuses, chrysanthemums, and gladioli, which were reported upon last year, were continued during the past season, and the results tend to confirm those already reported.

GERANIUMS.—From among 230 varieties of geraniums which have been tested for three years in succession, the following have been selected as a few of the most desirable for bedding purposes: *Scarlet*—Aceton, Director Marmy, Garden Director, General Grant, J. J. Harrison, Louis Fages, Marvel, M. A. Boleaus, Marquis de Garland, and W. A. Chalfant; *Crimson*—S. A. Nutt; *Rose*—Fanny Thorpe and La Contable; *Pink*—Eulalie, Madonna, and Mary Hill; *Salmon*—Dr. Verneull, John Good, and Mrs. E. G. Hill; *White*—Alpine Beauty, C. de Harcourt, La Favorite, and Mad. Buchner; *Silver-leaved*—Mad. Saleroi and Mrs. Parker; *Golden-leaved*—Crystal Palace Gem.

COLEUSES.—From among forty varieties of coleuses which have been tested for three years, the following have been found to combine the greatest number of desirable qualities: Alhambra, Beckwith Gem, Chicago Bedder, Charming, Excelsior, Electric Light, Firecress, Firebrand, Golden Bedder, John Good, Pink Gem, Paroquet, and Rob Roy.

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ANNUALS.—One of the most attractive flower borders on the grounds last summer was one filled with a collection of the old fashioned annuals. These cost but little, are easily grown, and may be had in variety and abundance by any one who cares to grow them. A knowledge of the habits of the different species and varieties is necessary to enable one to group and arrange the various kinds most satisfactory; but this comes with experience, and the acquisition of such information adds greatly to the interest in growing these flowers.

Without mentioning varieties, the following may be given as a few of the most desirable of the annuals of easy culture: Antirrhinum, alyssum, amarantus, asters, balsams, browallia, calliopsis, calendula, celosia, centaurea, clarkia, cosmos, delphinium, dianthus, eschscholtzia, gaillardia, godetia, gypsophila, marigolds, mignonette, morning glory, nasturtium, pansy, petunia, phlox, poppy, portulaca, salpiglossis, scabiosa, stocks, sunflower, sweet pea, verbena, and zinnia.

GLADIOLI.—Among several hundred gladioli grown here during the past four years, the following were some of the most admired. This list includes good representatives of the types generally grown, and with the varieties named a succession of bloom may be expected from the middle of July to the end of October: Achanti, Diamant, Deuil de Carnot, Domino Rose, Dr. Bailly, Erie, E. V. Hallock, E. Souchet, Formosa, La Parisienne, La Perle, Massena, Magenta, M. de Vilmorin, Nakomis, Nezidscott, Pacha, P. Hariot, Princeton and Snow-white.

CHRYSANTHEMUMS.—Two hundred and fifty varieties of chrysanthemums have been under test here for several years; and after a good deal of culling, we would recommend the following list, which includes not only good representatives of the different types but also a wide range of colors: *Japanese*—Autumn Glow, Georgina Pitcher, Harry Sunderbruch, Heron's Plume, Maud Dean, Mrs. W. H. Robinson, Mrs. L. Allen, O. P. Basset, Philadelphia, Pitcher and Manda, Queen, Viviand-Morel, W. H. Lincoln and Waban; *Japanese quilled*—Good Gracious, Helen Bloodgood, Iora, Kentucky, L. B. Bird and W. H. Rand; *Japanese hairy*—Beauty of Truro, Louis Boehmer, Leocadie Gentils, Mrs. Alpheus Hardy and R. M. Grey; *Chinese*—Cupid, Ideality, Mrs. L. C. Maderia, Mrs. Col. Goodman and Major Bonnaffon; *Anemone flowered*—Antonius, Condor, Descartes, Falcion, John Bunyan, Mad. Robert Owen, and Surprise; *Pompons*—Rose Travena, Golden Fleece, Black Douglas; *Single-flowered*—Eucharis and Framfield Beauty.

ACKNOWLEDGEMENTS.

I beg to acknowledge with thanks the following donations to this department during the past year:

Central Experimental Farm, Ottawa, Ont., plants of 24 varieties of gooseberries; S. H. Fulton, South Haven, Mich., plants of Wallace blackberry; L. Woolverton, Grimsby, Ont., trees of 11 varieties of French pears; E. D. Smith, M. P., Winona, Ont., trees of Emerald plum; A. E. Sherrington, Walkerton, Ont., seeds of Express tomato; Jas. Cormack, Guelph, Ont., gooseberry plants; James Goldie, Guelph, Ont., collection of bulbs; Prof. E. S. Goff, Madison, Wis., cuttings of Crandall currant.

All of which is respectfully submitted.

H. L. HUTT,
Professor of Horticulture.

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PART X.

REPORT OF THE PROFESSOR OF BACTERIOLOGY.

To the President of the Ontario Agricultural College:

SIR.—I have the honor to submit herewith my report for the year 1900; but as I did not return home from Europe till October said report is necessarily brief, comprising only notes on teaching, equipment, laboratory work, publications, and the most urgent needs of the Bacteriological department, together with one or two articles, and the work done by my assistant during my absence.

First of all, I should like to take this opportunity of acknowledging the kindness of the Hon. John Dryden, Minister of Agriculture, in allowing me to spend some time at study in Europe, and I trust that the experience which I gained during my sojourn in European laboratories will prove of service in the department over which I have the honor to preside.

During my absence Mr. Malcolm N. Ross, Fellow in the department, had charge of the laboratory until his departure to South Africa. His place was then filled by E. W. Hammond, D.V.S., and I must acknowledge the efficient services of both these gentlemen, who kept the work well in hand and the laboratory in first-class order. Dr. Hammond has contributed to this report the results of his work during the summer months.

Teaching.—The lectures given to students during the two semesters is as follows:

II. Year.—A course of 25 lectures on Bacteriology, especially its relation to dairying and agriculture.

III. Year.—A course of lectures on Hygiene, with special reference to rural life. Dr. Hammond gave these lectures during the fall term.

IV. Year.—Special courses and much laboratory work for specialists in Agriculture and Bacteriology.

Special Students.—A few students, wishing particular instruction in some branches of bacteriology, have worked in the laboratory during the past year and special instruction commensurate with their needs has been given them.

Dairy Students.—The usual course of lectures was given, and in 1901 it is my intention to supplement this by giving laboratory work.

Equipment.—Whilst in Europe, I was fortunate in having been able to secure several new tops for tables in the laboratory. These are made of enamelled lava, and are easily disinfected and cleaned; they also look well, are non-absorbent, and are impervious to acid and alkali. Several new cases for exhibiting specimens—as well as for general purposes— have also been added; and the beginnings of a bacteriological museum have been made.

Laboratory Work.—The laboratory records show that 1,193 doses of tuberculin, worth $119.30, and 57 starters, worth $28.50, have been sent out; and sixteen samples of water from different places have been chemically and bacteriologically analysed, the latter analysis being worth at the very least $5 per sample. In addition, a number of analyses of cheese, butter, milk, etc., have been made and the results reported directly to those sending the samples.

This I consider valuable work, as it supplies needed information to the inquirer, and benefits the laboratory by furnishing material for further research and study.

Publications.—Two bulletins have been published by the department during the year:—*Weeds of Ontario*, 80 pages, illustrated, and *Foul Brood of Bees*, 32 pages, illustrated; and the following publications have also been issued:—

"Die Lebensdauer des Tuberkel-Bacillus im Käse"—(Separa t druck aus dem Laudwirtschaftlichen Jahrbuch der Schweiz, 1900).

"Sur la loque"—La Revue Internationale d' Apiculture.

I have also handed in two other bulletins which I hope will soon be printed.

Most Urgent Needs.—On account of the demand for *practical* work in bacteriology for dairy students, the laboratory will have to be enlarged and properly equipped for such work. About sixty students take one or other of the dairy courses, and to

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impart instruction to this number at present necessitates the repetition of the same work six times, which involves a great waste of time and is very unsatisfactory to the students, because the delay makes it impossible to give any section of the class more than a week in the laboratory.

The Dairy Circular for 1900-1901 announces a special course in bacteriological laboratory work, together with experimental work, open to cheese and butter makers who have had at least three seasons' experience.

The relation of germ life to agricultural and dairy processes is becoming more apparent every day. Information along these lines is often required, and I know of no better way of imparting this information than through practical work in the laboratory. Hence, I think the importance of the work justifies a liberal appropriation to cover the cost of equipment and to provide the necessary room.

ASSISTANCE OFFERED TO CHEESE FACTORIES AND CREAMERIES.

In the year 1899, the circular below, "Assistance Offered to Cheese Factories and Creameries," was distributed to most of the cheese factories and creameries in the Province; and I should again like to draw the attention of butter-makers and cheese-makers to the contents of this circular. There have been, so far, very few applications for starters, and there can be only two reasons why this opportunity has not been more fully taken advantage of; either the butter-makers are unaware of the advantages to be derived from using pure-culture starters, or they have not received copies of this circular. In order to give information on this subject, I again insert this circular, and would call attention to the remarks made upon the subject of starters by Prof. Conn, of the Connecticut Experiment Station, who has recently been inspecting European Dairy methods; and I would add to it my own indorsement from what I saw whilst in Europe. Prof. Conn states as follows:—

"It has proved that the quality of the product is in considerable degree dependent upon the particular kind of bacteria which may ripen the cream. * * * These facts are well known, but the practical application of them has not been very widely extended in any European country, except Denmark and North Germany.

"In Denmark the use of pure cultures has become very common. It is stated that *over ninety-five per cent.* of the butter made in this great butter-making country at the present time is made by the agency of artificial cultures used in cream-ripening. This percentage is surprising and conveys a very great lesson. Danish butter-makers stand at the head of the profession for the world. Danish butter commands the highest price and has the highest reputation of all butters. The Danes themselves adopt with practical uniformity the use of pure cultures, and the undoubted inference to be drawn is that the use of pure cultures in cream-ripening is not only practical, but that it results in uniform advantage.

"The conclusion of the Danish association of butter-makers is given as follows: 'Butter made with pure cultures is almost always better than that made by the older method. While this is not always the case; and while it is true that some samples of butter made without pure cultures rank very high, there is no uniformity in regard to the grade of the other types of butter, while the butter made by pure cultures is of a uniform grade. There has been, since the introduction of pure cultures, a noticeable and an almost universal improvement in the grade of Danish butter in general.

"The results of this me hod of the use of pure cultures in Denmark are of course satisfactory, or the method would not be so widely used. It is somewhat more expensive than to make the butter without the use of pasteurization and pure cultures; and we may be sure that, if the results were not satisfactory, the process would not have been adopted in over ninety-five per cent. of the creameries."

The starters sent out from this laboratory are almost identical with some of those used in Denmark, and with proper care usually give good results. The use of these starters is not a question of mere scientific research; but it is a business-like method of producing a standard article. No man expects to obtain a good crop, if he sows impure seed; and he has no better ground for expecting good, uniform butter and cheese, if there are not present in the cream those germs which produce good flavor. Canadian cheese has already obtained a prominent place in the British market, and the prices obtained for this cheese are always higher than the prices for American and other imported cheese; but of late there have been complaints about the flavor of our cheese, and the reputation of Canadian butter is still below the mark. Usually the prices for Canadian butter are from ten to

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twenty shillings per hundred weight less than the Danish, and from two to ten shillings less than the Australian. It behooves us, therefore, to make use of the best technical and common-sense business methods. Australia, New Zealand, the Argentine Republic, and the United States are taking up the subject of Dairy Bacteriology much more scientifically than the dairymen of this country; and now that the effects of cold storage are being so closely watched by the British buyers, anything that tends to improve the quality of our food products should be taken advantage of to the fullest extent; and under this head I cannot too strongly urge the use of pure culture starters as a means whereby we may secure uniformity and better quality and keeping quality in creamery butter; and the extracts which I have quoted from Prof. Conn's report should be laid to heart by everybody engaged in butter production.

ASSISTANCE OFFERED TO CHEESE FACTORIES AND CREAMERIES IN ONTARIO.

It is the wish of the Bacteriological Department of the Ontario Agricultural College to get into touch with the makers in the cheese factories and creameries of the Province with a view to rendering assistance in cases of difficulty which may be due to undesirable bacterial infections.

Difficulties frequently arise, and we might mention a number of cases to show that many of the troubles in factories are due to infections with harmful bacteria. The following may be mentioned as amongst the most frequent causes of the trouble:

Carelessness or Thoughtlessness in Milking.—To avoid as far as possible contamination from milking, it is advisable before milking to :—

1. Brush well the cow's udder and that part of her thigh, flank and side next to the milker.

2. Rub the udder and teats carefully with a clean, damp cloth.

Defects in the Factory Itself.—In new or more modern factories there are not likely to be any grave defects in the building, but in some of those constructed years ago there may be defects in construction, or needed repairs may be neglected. Probably the commonest defects are (1) leaky floors, which allow whey or other liquids to drop through and decompose, giving rise to bad odors and a very undesirable kind of germ life that gets into the vats and causes serious trouble; (2) flies, which are a great nuisance in factories, as they feed or walk upon all kinds of decomposing matter, and then visit the factory, crawling over or dropping into the milk, and depositing various kinds of germ life, which are thus placed in excellent situations for further growth and development.

To avoid the trouble from leaky floors, many of the factories in the United States are putting in cement floors.

Faulty Equipment.—Great care should be taken in buying good utensils and seeing that they are kept in repair. The joints of tinware are often badly soldered and in some places not soldered at all. All joints should be made by lap-jointing and soldered flush with the tin. If this is not done, small spaces are left which it is impossible to keep clean and sweet, and these become so many crevices for the development of germ life.

Bad Drainage.—Several examples of bad flavors in cheese, caused by germs which have accumulated in drainage filth, have occurred during the last two years. The drains in these instances have usually been blocked, or have not had sufficient fall to take away the drainage quickly. Consequently masses of putrid material, whey or buttermilk, have collected in certain parts of the drain and have given rise to trouble in the factory.

Gassy Fermentations in Cheese.—This is the worst and commonest trouble in cheese factories, and it is caused by bacteria breaking down the sugar in the milk and producing gas therefrom. This gas causes the appearance known to cheese-makers as pin hole or gassy curds. These harmful germs gain admittance to the milk in the process of milking or after the milk is drawn from the udder. Particles of manure, stagnant water, and dirty pastures contain gas-producing germs in large numbers; and it is easy to see how they gain access to the milk by careless milking, for cows lying on the ground or walking through stagnant water get their hairy coats seeded with these noxious forms, and they are discharged from the animal's coat into the milk pail by the movements of milking. The high temperature at which milk is usually kept during the summer favors their growth; and they consequently become very numerous in the milk. We have recently made several analysis of water from cheese factories, and have found therein large numbers of gas-producing germs.

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Bad Flavors.—These are sometimes due to the foregoing causes, and they may also arise from the use of contaminated well-water. For example, the cheese in an eastern factory was "off flavor"—an abnormal condition arising from the presence of a noxious germ in the cheese—and the germ causing the trouble was found in the well-water which was used in setting the vats. The water had acted as a starter, and a change in the water supply at once removed the trouble.

The high average temperatures of curing rooms in summer time favors the growth of many of these undesirable germs in cheese.

Other Defects in Cheese.—There are many well-known defects in cheese, generally spoken of as "off flavor," "not clean flavor," "tainted," "bitter," etc., all of which are abnormal flavours due, in the majority of instances, to noxious bacteria gaining access to the milk. Bacteria from dirty whey tanks and from carrying whey in milk cans are frequently responsible for these conditions.

Color or Pigment in Cheese.—A number of abnormal changes, manifested by the production of various colours in cheese, are caused by bacteria. A common result from such bacteria is red crusty cheese, the discoloration being noticeable on the edges of the particles of curd. Blue, black, and green cheese are also caused in this way, but not so frequently. Mottled cheese likewise belongs to this category.

Lack of Flavor of Butter.—This trouble is often due to the absence of the proper flavour-producing organism, a condition which is overcome by the use of a starter. In a lengthy research on the flavour of butter, caused by the bacteria commonly found in milk, we separated some twenty different species, made starters from each species, and inoculated pasteurized cream therewith, in order to ascertain the effect of each individual species on the flavour of the butter. In the majority of cases, the butter lacked flavour; and in six instances it had a very undesirable taste.

"*Putrid Butter,*" "*Lardy Butter,*" "*Bitter Butter,*" *etc.*—The peculiar tastes or flavors of all these varieties are caused by the presence and growth of undesirable bacteria in the cream.

Need of Improvement and Help Offered.—Having thus briefly referred to some of the most common defects in factories, and the causes of many of the troubles in the manufacture of butter and cheese, we may emphasize the fact so often stated, viz., that the markets of the world are becoming more and more particular and want nothing but *prime* articles. Hence it is necessary to make and export only the best products.

In order to help makers, we are prepared to undertake the bacteriological investigation of any of the above or similar troubles. While it is manifestly impossible for us to investigate every difficulty which may arise, we are willing to inquire into all serious troubles, or all cases in which the trouble is continuous, and we shall do our best to find the cause and suggest remedies.

With this object in view, we ask that samples of milk, butter, or cheese injuriously affected in any way be at once sent to our department with a letter giving all details as fully as possible. Large quantities need not be sent, but care must be taken to send samples which *fully represent* the trouble complained of. About two ounces of butter or cheese, and three or four ounces of milk, whey, or buttermilk, are sufficient, and, if properly packed, they may be sent by mail.

If any doubt arises as to the purity of the water used in the factory, send it to us and we will examine it for the presence of gas-producing germs and as to its general suitability for factory use. Send about four ounces in a clean bottle that has been thoroughly washed out with boiling water. Where an exhaustive analysis is necessary more water will be required. In such cases, examination will be both chemical and bacteriological, and the following directions are given :—

Samples of Water for Analysis.

Container.—A bottle of not less than one-half gallon capacity is to be used, preferably one with a glass stopper. If there is no glass stopper, the bottle must be fitted with a new cork.

Preparation.—The bottle must be thoroughly cleaned, all foreign substances being removed. Then it must be scalded out with boiling water and allowed to drain until cool.

Taking of Sample.—If the sample is to be taken from a well, the water must be

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pumped out for about five minutes, or long enough to empty all pump connections before the sample is taken; if from a tap, the water must be allowed to run to waste for about ten minutes, or long enough to empty all local laterals, before sampling. Water standing in the pipes in a house is under very favorable conditions for the multiplication of bacteria. If, therefore, the precaution of running off the water be not taken, a very erroneous conclusion as to the number of bacteria present may be arrived at. If the sample is to be taken from a lake or stream, it must be taken some distance from the shore, the sampling vessel being plunged, say, a foot and a half below the surface, to avoid the surface scum. Samples are not to be taken immediately after a storm. Wherever the sample is to be taken from, the bottle must be rinsed out several times with the water to be analyzed before the sample is taken. The bottle must not be filled quite full, a small space being left for the expansion of the water. It must be tightly corked and a piece of cloth tied over the neck to keep the cork in place. Sealing wax must not be used.

Packing.—If the weather is warm, the bottle should be packed in ice. During the winter, saw-dust may be used. The water should arrive at the laboratory at, as nearly as possible, the same temperature as when the sample was taken.

Notification.—Send notice by mail stating by what express company you are sending the water, and the date of the shipment. Also give as fully as possible the history of the well or source of water, and remarks on the sanitary surroundings.

Note.—On application, a suitable bottle, properly prepared, will be sent to the applicant.

Personal Visits.

In cases where the affection is a serious one, a personal visit may be necessary, and will be made.

Assistance Offered to Veterinarians and Farmers.

For the year 1901, I would supplement the circular issued to dairymen by offernig assistance to veterinary surgeons and others interested in the care of live stock.

There is in connection with the Provincial Board of Health a laboratory for research work in human pathology; but at present there is not any laboratory in the Province devoted to the solution of the problems which are constantly arising in the veterinary art. In many cases, we might, we think, give material aid, by investigating the *cause* of a disease, or in diagnosing obscure cases. We are enabled to do this because of our laboratory appliances. No veterinary surgeon or stock man keeps high power microscopes, incubators, and the other necessary laboratory apparatus for bacteriological or pathological work; and yet these are often essential to a correct diagnosis of the diseases of live stock. We shall mention in order a few points on the subject of what to send and how to send it.

In Cases of Disease.—Send the organ or material, carefully wrapped in an antiseptic wrapper, giving full particulars regarding it. It is best to send by express; and in summer it may be necessary to pack in ice.

In cases supposed to be or suspected of being:

Anthrax,—send an ear or some of the blood, spleen or liver of the dead animal.

Symptomatic Anthrax, Black-leg or Quarter Evil,—send the parts infected, as this disease is usually in the muscles.

Malignant Œdema (similar to black leg, but showing more fluid in the subcutaneous tissues, which, unlike the fluid found in cases of black leg, is almost colorless),—send the part affected.

Tetanus or Lockjaw.—On account of the difficulty of finding the bacillus of this disease, it is almost useless to send material, unless the point of inoculation is known, in which case, cut away and send the flesh around the point of inoculation.

Glanders (a disease which affects either the nasal passages or the skin, in the latter case called *Farcy*),—send some of the ulcers from the parts infected, or of the discharge from the nasal passages.

Hog Cholera and Swine Plague,—send any diseased portions of the animal.

Actinomycosis or Lumpy Jaw,—send in a bottle a little of the matter found in the tumor mass.

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Rabies or Hydrophobia,—send the base of the brain or *medulla oblongata* of the animal suspected.

Tuberculosis and Pseudo-Tuberculosis,—send any tubercles or diseased glands.

In cases of diseases affecting poultry, such as Chicken Cholera, Roup, Tuberculosis or Entero-Hepatitis,—send the whole bird.

THE MILK SUPPLY COMPANY OF COPENHAGEN.

The operations of this company have already been several times described in the Agricultural Press of North America, but as the details have not been fully given, it seems advisable to put into print a résumé of the practice of milk handling followed by such an up-to-date corporation as the Copenhagen Milk Supply Company. The recent interest manifested by the public in all problems connected with the supply of wholesome milk shows that, not only is there a growing determination to get good, pure milk, but that enterprising individuals are willing to cater to this desire of the consumer.

Without entering into a history of the company referred to, suffice it to say that since its organization in 1878, its continued success has been attained by strict attention to the object of the undertaking, viz., to supply pure and unadulterated milk to the inhabitants of the city (Copenhagen), and especially to the infant population.

For the sake of clearness the operations of the Company may be summarized under the following heads:

1. Regulations respecting the treatment and feeding of the cattle and the handling of the milk.
2. Infectious diseases in families of the work people.
3. Inspection.—(*a*)Veterinary, and (*b*) Dairyman's.
4. Transportation.
5. Handling on the Company's premises in the city.
6. Sale.

1. Regulations respecting the treatment and feeding of the cattle and handling of the milk

Feeding of Cows, etc.—The food of the cows must be of such nature and quality that no bad taste or taint may be imparted to the milk by it. The feeding of brewer's grains and all similar refuse, turnips, rutabaga, and kohlrabi is absolutely forbidden. Carrots and sugar beets or mangels are permitted up to one-half a bushel to each cow per day, but only when at least seven pounds per head of corn, bran, and cake are given along with them. Cows supplying infant milk may get carrots, but never more than one-quarter bushel per head. Rape seed cake is the only oil-cake which may be used, one and one-half pounds per day as the furthest limit; but infant-milk cows must not receive any cake.

Stall feeding in summer is absolutely forbidden. The cows must be fed in the open air upon clover grass. Vetches are forbidden. In case of necessity, however, dry food may be given, but must always be fed in the field. In autumn the cows must be clipped on the udder, tail, and hind-quarters before being taken into the stable.

Calving must be so regulated that the milk sent in during the months of September and October is not less than two-thirds of the largest quantity sent in any other month.

The milk of cows newly calved must be withheld twelve days after calving.

Milking Regulations—The greatest cleanliness must be observed during milking, and the milk must be strained through a wire sieve covered with a clean woollen cloth. Immediately after milking, and during all seasons of the year, the milk must be cooled down with ice water to 40° F. Every farmer must be provided with a cooler, which he can obtain on hire from the company. Thirty pounds of ice must be kept in stock for every one hundred pounds of milk produced.

Delivery of Milk to the Nearest Station—The milk sent from the farm must be sent no earlier than is absolutely necessary for its arrival in proper time at the railway station, and in summer the van conveying the milk must be provided with a cover to protect the milk from the heat of the sun.

The company provides all cans and these are washed by the company, but on reaching the farm they must be rinsed, to get rid of any dust or dirt which may have adhered to them during the return journey. Until required the cans must be protected from im-

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purities and placed in a cool airy spot, with lids off and bottoms upward, in such a position that the air can get freely into them.

2. Infectious diseases in the families of the work people.

The farmer must promise to inform the company of any case of illness to any who reside on the farm; and should a case of infectious disease arise among them, he must immediately report the fact to the company and withhold the milk he supplies, which will nevertheless be paid for as usual, so long as these conditions are fully complied with.

Medical supervision of the company's employes is also provided for; and if any are suspended from work on account of illness, they still receive their full wages.

3. Inspection.

(a). *Veterinary Inspection*—Every cow that supplies milk to the company is subject to fortnightly inspection by the company's veterinary surgeon. Every animal is carefully examined, notes are made, and these compared with similar records taken on previous occasions. Special attention is paid to the lungs and udder of all animals, lest they should be tubercular. All cows which supply children's and infants' milk are tubuculin-tested, and no reacting animal is allowed to supply milk for such use. The veterinary inspector also reports on the condition and quality of the food, and the state of cleanliness of cows and cowsheds.

(b) *Inspection by a Practical Dairyman.*—In addition to the veterinary inspection, the company sends out its own inspector to make reports on the efficiency of the cooling apparatus, the cleanliness practised in milking, the use of ice, and other smaller but, nevertheless, important details.

4. Transportation.

The milk is transported from the farm to the nearest railway station, and is there put in special cars owned by the company. These cars are equipped with large tanks in which ice is placed during the summer months to keep the temperature down to at least 50° F.

5. Handling of the milk in Copenhagen.

The milk arrives on the company's premises about eleven o'clock in the evening. It is then weighed, sampled for subsequent analysis, the temperature taken, and the taste noted. (Experienced tasters taste every can, and for each can of tainted milk they detect a small reward is given them). Milk with a temperature above 50° C. is set aside, as is also any that is tainted. The cans are then placed in large ice tanks, there to remain until early next morning, when the milk is run through the filter, and tapped off into cans or bottles.

Filters.—The filter consists of two enamelled iron tanks placed at different levels; a pipe in the form of a syphon has its long limb connected with the bottom of the upper tank, and its short limb with the bottom of the lower tank, so that the milk poured into the upper tank comes up as a kind of spring at the bottom of the lower one. On the bottom tank there are three layers of gravel, that in the lowest layer being about the size of a pea, in the middle layer somewhat smaller, and in the third or top layer a little larger than a pin's head. The layer's are separated from each other by perforated tin trays.

On the top of the uppermost layer of gravel are five thicknesses of fine cloth. The whole is kept in position by a pyramidal frame work which presses down the tin trays. As the milk rises to the top of the tank, it passes into a large storage or mixing receptacle, and thence into the bottling room.

There are four of these filters, one small one for cream, one very big one for children's milk, and two large ones for other milk.

Bottling, etc.—From the storage tank the cans are filled and weighed, then labelled and sealed with a leaden stamp seal, and taken off in the carts for delivery. The children's milk, from tuberculin-tested cows, is filled into bottles. A machine similar to that used for bottling beer, fills six bottles at once; these are passed on to a woman who corks them by machinery, and on again to another who ties a string over each cork and seals it with a leaden seal. The bottles are then placed in wooden trays, covered with ice, and removed to the waggons. The cream is treated the same way. Infants' milk is sterilized and filled into sterilized bottles, each holding sufficient for one meal.

Kinds of Infants' Milk.—The infants' milk is sent out in five different qualities:

No. 1A	stand containing	10	bottles	each holding	135 c. c.	1 part milk,	2 parts	water.
2A	"	" 9	"	"	135 "	1	" 1	"

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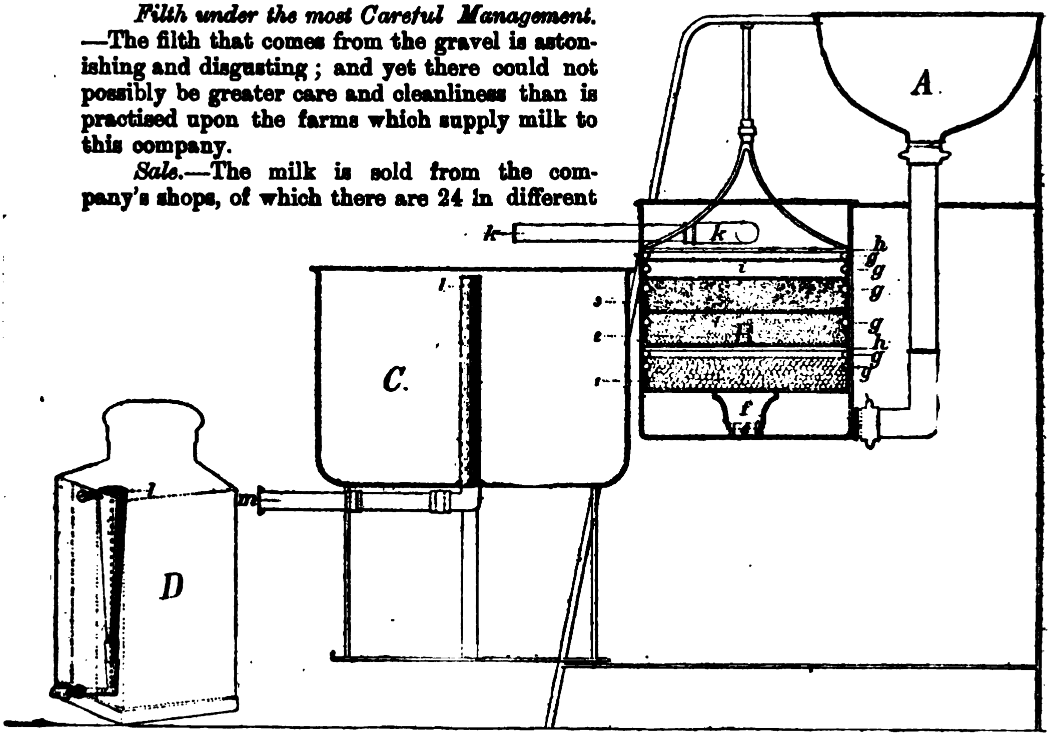
No. 3A stand containing 8 bottles each holding 139 c. c. 2 parts milk, 1 part water.
4A " " 8 " " 140 " 3 " 1 "
5A " " 7 " " 147 " whole milk.

Washing of cans and cleaning of filters.—The bottles and cans as they come in are most carefully washed, first in water and soda, then scrubbed in boiling water, and steamed with live steam; afterwards the cans are passed through a solution of lime water which cleanses the cans, and takes away the grease that is so often noticed on ordinary washed cans.

The filters are taken to pieces immediately after use, the gravel is washed in hot water, until the water comes off quite clean. It is then steamed at a temperature of 302° Fahrenheit, after which it is spread out on shallow trays and baked at a high heat. For the concluding operation, the gravel is placed in a winnowing machine which drives off all the particles of fine dust.

Filth under the most Careful Management.—The filth that comes from the gravel is astonishing and disgusting; and yet there could not possibly be greater care and cleanliness than is practised upon the farms which supply milk to this company.

Sale.—The milk is sold from the company's shops, of which there are 24 in different



FILTERING APPARATUS.

A. Receiving-tank B. Filter. C. Storage or mixing-tank. D. Milk-can which is sealed and locked into delivery-vans. *e.* India-rubber ring to preserve enamel against the *f.* Iron foot-piece, or base. 1,2,3. Perforated metal-trays, to hold the gravel, of which No. 1 is the coarsest. *g, g, g.* India-rubber rings to protect enamel. *h, h, h.* Galvanized rings. *i.* Five ply of filter-cloth of close texture, surmounted by one ply of very fine texture. *k, k.* Pipes which lead off milk as it rises in filter-tank into storage tank. *l, l.* Perforated tubes so constructed as to draw milk from every part of the tank or can and so equalize the quality. *m.* Pipe leading through partition to bottling-room.

parts of the city; from stationary hand wagons, of which there are 14, each always stationed in the same place, usually in some square into which a number of streets open; and from the ordinary wagon which provides households. The delivery is but once a day. All the wagons are so constructed that there can be no tampering with the cans. Every can and every van door containing cans is sealed; only the taps project, and these have a cover to prevent the street dust from soiling them. In all cases, the cans are surrounded by ice in hot weather. The bottled milk is kept in a separate compartment; and as already been mentioned, each bottle is sealed with a leaden seal, so that the contents cannot be poured out, unless the seal is broken. In this way customers are protected against dishonesty or fraud in tampering with the bottles.

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Delivery Cans.—The cans are of tin, very strongly made, and hold about 100 pounds each. Round tins are used for the unskimmed milk, and square tins for the half-skimmed milk. There are no joints or seams in the body of the can, as they are all stamped out. The lids are flat, so that a number of cans can be placed on top of one another, without danger of their falling down.

An ingenious contrivance in each can insures to the customer his proper supply of cream, because when the milk is left standing in the van for several hours, the cream naturally rises, so that if special provision were not made, the last customer would receive much richer milk than those first served.

This contrivance consists of a perforated cone connected with the discharge valve. The perforations extend the whole length of the pipe; so when the tap is opened, the milk flows from all parts of the can, through the holes into the tube, and down through the tap. A reference to the illustration will explain the construction.

Prices of Milk and Wages of Employees.—All the employees are in uniform, and every van has the trade mark of the association, a red and white clover blossom painted on a black triangle.

The following are the kinds of milk sold and the prices obtained:—

Half-skimmed milk..........................	10c. per gallon.
Sweet milk..	20c. " "
Sweet milk in bottles (from tuberculin-tested cows) per quart bottle..	4½c.
No. 1 cream..	$1.20 per gallon.
No. 2 cream..	75 " "

The half-skimmed milk has been deprived of from 2 to 3 per cent. of its fat, which can be obtained more cheaply in some other form, and is the most nourishing form of food that can possibly be obtained for the price at which it is sold, viz., 2½c. per quart.

The drivers receive about ½c. for every quart of milk they sell, and from their total earnings about 27c. are deducted for the use of horse and cart, and half that sum for the assistance of one or two boys. The assured wage of men is 75c. per day, with their uniform and as much milk as they can drink on the premises. Boys under 14 earn $3.00 a month for half a day's work, they being obliged to attend school during the afternoon.

A BIOLOGICAL STUDY OF PASTEURIZED AND UNPASTEURIZED MILK.

By E. W. Hammond, D. V. S.

During the spring and summer of 1900, I conducted a series of experiments with the object of ascertaining the extent of bacterial growth in unpasteurized and pasteurized milk, and of noting the effects produced by the separate species of bacteria upon milk.

In all thirty-two samples of milk and two samples of cream were examined. In the series of investigations which have covered the major part of seven months, it has been possible to discover the flora of unpasteurized and pasteurized milk at different temperatures. The usual bacteriologial methods of isolating bacteria were employed, plates and tubes being made with ordinary nutrient gelatine and with whey gelatine made slightly alkaline in reaction. The resulting colonies were then tested and their action on milk determined by direct seeding from the plates into small flasks containing sterile milk, which were kept at temperatures ranging from 20°c. to 35°c., according to the rate of growth and nature of germ. Those species that had affected the milk so as to cause curdling and souring were particularly investigated, together with species that produced odors and discoloration of milk, also those that were of the disease-producing variety. In the tables appended will be found a summary of the results obtained. Every precaution was taken in the collection of samples; sterilized flasks were used, which were closed by means of a tampon of sterile cotton wool.

Milk should be used within twenty-four hours after pasteurization; although pasteurized milk will not sour for several days, providing it is kept cold. Some of the flasks of pasteurized milk which were left standing upon shelves in the laboratory during the month of May, showed no change to have taken place before three days, and in two in-

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stances was found io be absolutely pure at the end of a fortnight. Milk heated to 160°F. is fairly sterile. Milk which, before pasteurization, contained several thousand of living germs in each cubic centimeter, as a rule after pasteurization, except at very low temperatures, showed no growth when cultures were made on gelatine in four days.

Table No. 1.

No.	Date.	Atmospheric temperature. Max.	Min.	Treatment of milk.	Number of cultures made.	Remarks.
1	April 19th, 1900	51°F.	43°F....	Pasteurized	2	No growth.
				Unpasteurized.......	2	growth.
2	April 21st	60°F.	49°F....	Pasteurized	2	Slight growth.
				Unpasteurized.......	2	Extensive growth.
3	April 24th	58°F.	53°F....	Pasteurized	2	Slight growth.
				Unpasteurized.......	2	Extensive growth.
4	April 26th	59.5°F.	50°F....	Pasteurized at 174°F..	2	No growth.
				Unpasteurized.......	2	Extensive growth.
5	April 28th	67°F.	57°F....	Pasteurized at 174°F..	2	No growth.
				Unpasteurized.	2	growth.
6	April 30th	49°F.	54°F....	Pasteurized, 145°F...	2	Growth.
				Unpasteurized......	2	Growth.
7	May 1st	48°F.	43.5°F..	Pasteurized, 145°F...	2	No growth.
				Unpasteurized.......	2	Growth.
8	May 3rd	40°F.	38°F....	Pasteurized..........	2	No growth.
				Unpasteurized.......	2	Growth.
9	May 4th	42°F.	37.5°F..	Past'zed, 140°F,150°F	2	Growth.
10	May 5th	47°F.	37°F....	Pasteurized, 160°F ..	2	No growth.
				Unpasteurized.......	2	Growth.
11	May 7th	55°F.	42°F....	Pasteurized, 195°F...	2	No growth.
				Unpasteurized.	2	Growth.
12	May 10th	50.5°F.	....	Pasteurized, 198°F..	1	No growth.
				Unpasteurized......	1	Growth.
13	May 14th	79°F.	71°F....	Pasteurized, 206°F...	1	No growth.
				Unpasteurized	1	Extensive growth.
14	May 16th	at noon	57°F....	Pasteurized..........	1	No growth.
				Unpasteurized	1	Extensive growth.
15	May 17th	82°F.	....	Pasteurized..	1	No growth.
				Unpasteurized	1	Extensive growth.
16	May 21st	78°F.	68°F....	Pasteurized..........	1	Growth.
				Unpasteurized	1	Growth.
17	May 26th	80°F.	75°F....	Pasteurized, 153°F...	1	Growth.
				Unpasteurized.......	1	Growth.

Table No. 2.

Bacterial analysis of the different species of germs isolated and the changes which they produced when seeded into flasks containing sterile milk and inoculated into animals. Intraperitoneal injections of one-half cubic centimetre of culture were used for each animal.

No. of experiment.	No. of Colony.	Variety of germ isolated.	Temperature best suited for growth of germ.	Changes produced in the inoculated milk.	Kind of animal inoculated.	Results of inoculations.
1	1	Bacillus	25° Centrigade	Milk curdled, odor of butyric acid, color remained normal.	Guinea pig.	Non-disease producing.
2	1	Yeast........	25° "	Delicately curdled.....	"	"
	2	Sarcina	20° "	Milk curdled, curd shrunken, whey clear, odor normal, yellow in color.	"	"

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TABLE No, 2.—*Continued.*

No. of experiment.	No. of Colony.	Variety of germ isolated.	Temperature best suited for growth of germ.	Changes produced in the inoculated milk.	Kind of animal inoculated.	Results of inoculations.
2	3	Bacillus	25°-30° "	Milk not altered, odor and color remained normal.	Not tried...	....
	4	Bacillus......	25 -30 "	Milk not altered, odor and color remained normal.	" ..	....
	5	Diplococcus..	20 -25 "	Milk curdled, whey cream-colored, odor musty.	Guinea pig.	Disease producing
3	1	Micrococcus .	20 -25 "	Milk curdled, whey clear, odor acid, color normal.	Not tried..	....
	2	Bacillus	20 -25 "	Milk curdled, odor acid, color normal.	" ..	....
	3	Bacillus......	20 -25 "	Milk curdled, odor fruity, color normal.	" ..	....
	4	Bacillus......	20 -25 "	Milk not altered, odor and color remained normal.	" ..	....
4	1	Bacillus......	20 -25 "	Milk not altered, odor and color remained normal.	" ..	....
	2	Micrococcus .	30 -35	Milk became slimy, and yellow in color.	" ..	Disease producing
	3	Bacillus......	25 -30	Milk curdled, no odor, color remained normal	" ..	Non-disease producing.
5	1	Bacillus.....	20 -25 "	Milk first curdled, and then dissolved, odor rancid, color pink.	" ..	Disease producing
	2	Bacillus......	20 -25 "	Milk became slimy, odor rancid, color normal,	" ..	Non-disease producing.
	3	Sarcina......	20 -25 "	Milk slightly curdled, color buff, odor normal.	" ..	....
6	1	White mould	20 -25 "	Milk not altered........	" ..	....
	2	Yeast........	20 -25 "	Milk curdled and gassy, whey clear, cheesy odor.	Guinea pig.	Non-disease producing.
	3	Bacillus......	25 -30 "	Milk curdled, shrunken floating curd, odor fruity, color delicate pink.	"	"
	4	Bacillus......	20 -25 "	Milk coagulated, curd digested, cloudy whey	"	"
	5	Bacillus......	25 30 "	Milk delicately curdled, casein digested, fruity odor, whey slimy, color greyish green.	Rabbit	Disease producing
	6	Micrococcus..	20 -25 "	Milk curdled, odor acid, color normal.	Not tried..	....
	7	Bacillus......	20 -25 "	Milk not altered.	" ..	....
	8	Bacillus......	20 -25 "	Milk not altered.	" ..	....
	9	Bacillus......	20 -25 "	Milk not altered.	" ..	....
	10	Micrococcus..	20 -25 "	Milk not altered.	" ..	....
	11	Bacillus......	" "	Milk curdled, curd digested, odor rancid, color normal.	Guinea pig.	Non-disease producing.
	12	"	" "	Milk curdled, creamy curd, odor acid, color normal.	Not tried..	....
7	1	Micrococcus..	20°-25° Cen'gde	Yellow scum formed on surface, no odor.	Guinea pig,	Disease producing
	2	Yeast	" "	Milk curdled, large gas holes in curd, fruity odor.	Not tried..	....
	3	Bacillus.....	" "	No milk...............	" ..	....
	4	"	" "	Milk curdled, odor acid, color normal.	" ..	....
8	1	"	" "	No change in milk	" ..	....
	2	"	" "	" "	" ..	....

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TABLE No. 2.—*Continued*

No. of experiment.	No. of Colony.	Variety of germs isolated.	Temperature best suited for growth of germ.	Changes produced in the inoculated milk.	Kind of animal inoculated.	Results of inoculations.
8	3	Mould	20°-25° Cen'gde	Mould developed slowly upon surface of milk.	Not tried..	....
	4	Bacillus......	" "	No alteration of milk ..	" ..	....
	5	Micrococcus..	" "	" "	" ..	....
9	1	Mould	" "	Milk curdled, odor acid, white mould developed upon surface.	" ..	....
	2	Bacillus......	" "	Milk curdled, odor acid, color pink.	" ..	....
10	1	"	" "	Milk curdled, no odor, color slate.	" ..	....
	2	"	" "	No alteration of milk...	" ..	....
11	1	Sarcina	" "	Casein digested, odor rancid, color light yellow,	Guinea pig.	Non-disease producing,
	2	Bacillus......	" "	Milk curdled, odor acid, color normal.	Not tried..	....
12	1	Micrococcus..	" "	No alteration of milk ..	" ..	....
	2	Bacillus......	" "	Milk curdled, odor acid, color normal.		
13	1	"	" "	Milk curdled, gassy curd, odor acid.	" ..	....
	2	"	" "	Milk curdled, odor acid, color normal.	" ..	....
	3	Streptococcus	25°-30° "	Milk curdled, no odor, color normal.	Guinea pig.	Non-disease producing.
	4	Bacillus......	20 -25 "	Milk curdled, gassy curd, odor musty, color, cream.	"	"
	5	"	30 -35 "	Casein digested, odor fruity, color greyish green.	"	Disease producing
	6	"	20 -25 "	No alteration of milk...	Not tried..	....
14	1	"	" "	Milk curdled, color and odor normal.	" ..	....
15	1	"	" "	Milk curdled, odor acid, color pink.	" ..	....
	2	"	" "	Milk first curdled and then digestion of casein took place, odor rancid, color slate.	Guinea pig.	....
	3	Micrococcus..	" "	Milk became slimy, odor rancid, grey color.	"	Disease producing
16	1	Bacillus......	30 -35 "	Milk curdled, odor fruity, color greenish.	"	"
	2	"	20 -25 "	Milk curdled, odor rancid, color light brown.	Rabbit....	Non-disease producing.
	3	Micrococcus..	" "	No change in milk.....	Not tried..	....
	4	Bacillus......	" "	Milk became ropey, color slate, no odor.	" ..	....
	5	"	" "	Milk curdled, color light pink, odor acid.	" ..	....
	6	"	" "	Milk curdled, gassy curd, odor musty, color light yellow.	Guinea pig.	Non-disease producing.
17	1	Mould	" "	Milk slightly curdled, odor good, color normal.	Not tried..	"
	2	"	" "	Milk slightly curdled, odor good, color normal.	" ..	"

According to some investigators, heating milk to high temperatures, over 158°F, gives to the milk a disagreeable, cooked flavor

The Danes heat their milk to much higher temperatures, sometimes to 35°F higher than is thought safe, yet they have been most successful.

The principal cause of the cooked flavor is not the high temperature at which it is pasteurized, so much as the exposure of the hot milk to the oxygen in the air. Milk is

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heated in a Danish pasteurizer and quickly cooled, acquires very little of the cooked taste, such as is noticed when it is heated in open pasteurizers.

The milk passing through a continuous pasteurizing machine, starts at a low temperature and only reaches the "pasteurizing temperature" for a very short time, (a fraction of a minute) just before it leaves the machine.

The Danes take as the minimum temperature for continuous pasteurization, 185°F, which is 25 degrees higher than the temperature used in most of our tests. This degree has been found necessary to kill all the germs of tuberculosis, and some of the more resistent germs that are known to cause serious trouble in infants and invalids.

Results. When the milk was run through the pasteurizing machine at low temperature, the effectiveness of germ destruction varied greatly. When the temperature was raised to 160°F, the effect was excellent. The number of germs was reduced, and those of a disease-producing variety were all killed.

Butter and cheese were made from samples from which these experiments were made, the results of which will be found in Prof. Dean's part of this report.

Conclusions. Previous tests prove that continuous pasteurization has been made a too low temperatures, to insure the getting rid of the germs which cause bad effects.

Heating milk to a temperature of 160°F insures the death of "bacillus tuberculosis" in 15 minutes, reduces the number of other bacteria, and does not give a permanent cooked taste.

THE STRUGGLE AGAINST BOVINE TUBERCULOSIS.*

By Dr. Med. B. Bang, Professor in the Royal Veterinary College, Copenhagen.

The conflict with tuberculosis in the domestic animals demands our attention from two points of view: first, because in most civilized countries it is, of all contagious diseases, the one which causes the greatest economic losses; and, secondly, because it is one of the sources of human tuberculosis. We shall limit our studies essentially to bovine tuberculosis, because there is no doubt that most of the other domestic animals take the malady from cattle, and much less frequently from man.

Whilst in many European countries, tuberculosis is a disease of ancient date (in the north of Germany, for example, it played an important role at the end of the last century), it may be shown that in the course of the past century it has spread to many other countries where before this time it was almost unknown.

In Denmark, during the first half of the century, it was introduced by cattle from Switzerland and Schleswig and from England In Sweden and in Norway, the same thing happened, and is always taking place, especially on account of English cattle being imported.

In Finland, during the last twenty years, one sees the same thing repeated; and in Hungary, the facts are similar. Everywhere one finds the original races of the country sound or almost sound, and the disease introduced usually in cattle imported to improve the breeding of the native cattle and develop the dairy industry.

The great propogation of tuberculosis in the the states of the north and east of America is without doubt due to the same cause. As with other contagious diseases, it is introduced by animals which are affected; and in all countries in which the disease has remained for a long time, there has been a very wide-spread extension in the course of this century.

The statistics of the large public slaughter houses and the tuberculin tests have furnished us with data concerning the extension of the disease.

In Germany, the best data came from the slaughter houses. In 1895, one finds in

*Thinking that it might interest and profit some readers of this report, I have ventured to translate from the Danish certain portions of a work on tuberculosis, *Kampen mod Tuberkulosen hos Kvaeget*, by Professor Bang, of the Royal Veterinary College, Copenhagen, Demmark, 1900; and an article by the same author in a Scandinavian magazine, *Nordiskt Medicinskt Arkiv*, 1899, No. 22.—F. C. Harrison.

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the slaughter houses of Hamburg, 8.56 per cent. of the cattle tubercular; Prussia, 12.7 per cent. in 1895, 14.3 per cent. in 1896, and 15.8 per cent. in 1897; and in Saxony, 27.5 per cent. in 1895, and 26.7 per cent. in 1896. Although these figures are very large, it is necessary to remember that the animals with most diseases are not sent to the abattoirs, and that in some abbatoirs, the percentages of tubercular animals are even greater. Thus in 1896, Leipsig had 32.9 per cent. and Zwickau, 37.5 per cent, ; in 1894, Schwerin had 35 per cent. ; and in 1897, Kiel had 48.1 per cent. In Bavaria and Baden, there is a general control of the meat from all the country; but as the control is exercised in a large number of cases by empiric methods, the figures given, viz., 5 per cent. and 3.6 per cent., respectively, are without doubt too small; and what seems to prove the statement is the fact that in Bavaria in 1895 and 1896, tuberculin tests upon 5,402 animals and 2,596 animals, 37 per cent. and 41 per cent. respectively showed a typical reaction, and in 11 per cent. and 7.6 per cent. respectively, the reaction was doubtful.

In the department of Weisloch, Zahn, in 1896, found that of 68 common bulls, 32.3 per cent, and of 79 cent. cows and steers, 46.9 per cent. gave typical reactions.

In Saxony, Siedamgrotzky found in 1891, out of 259 cattle examined by him, 79 per cent. which gave reactions, and later Eber found out of 154, 80 per cent of reacting animals.

In Austria, the statistics of the slaughter houses of Vienna give very favorable figures for the years 1893 to 1895, i. e., 1.7, 1.61, and 1.31 per cent. tubercular, but a large number of butcher's cattle in that country came from Hungary where, without doubt, very little tuberculosis is found. Moreover, it seems probable that the slight cases were not counted. This supposition is rendered probable by the circumstances that in Moravia, in 1893 to 1896, only 0.81 per cent. of tubercular animals were found in 312,822 slaughtered during that time; while in 1897, out of 2,314 animals, 38.4 per cent, gave a typical reaction and 4.4. per cent. an uncertain one. Of 512 animals slaughtered, certain Austrian Veterinary Surgeons found 43 per cent tubercular.

Switzerland. Here tuberculosis seems very much extended in several of the cantons; in fact, the disease has been regarded as a scourge for a long time. In 1896, Strebel said that in the Canton of Fribourg, of 2,212 animals slaughtered, 12 per cent. had been attacked by tuberculosis. Zschokke tells us that in 1896 tuberculin tests were made upon 99 animals, 52 per cent. of which re-acted. In the Canton of Geneva in 1894, there were 212 subjects and 41 per cent. reactions.

In France, tuberculosis seems very rare in certain districts, whilst in others it causes great losses. Thus, Nocard says that the most expert veterinarians in the Departments of Brie and Beauce record 25 per cent. of the cattle as tubercular. In the abattoir of Toulouse in 1899, 9.28 per cent. of the cattle were found tuberculous; and the numerous tuberculin tests made by Nocard suffice to show that tuberculosis is very extensive upon French estates.

Belgium.—A report issued in 1896 shows that 19,004 cattle upon 2,905 farms were tested with tuberculin, and that 48.8% of these animals reacted.

In Holland, the record of the abbatoir in Amsterdam shows the following percentage of tuberculous animals:

1888	1.7 per cent.	1892	5.3 per cent.
1889	2 " "	1893	5.26 " "
1890	3.3 " "	1894	6. " "
1891	5.3 " "	1895	6.8 " "
		1896	8.12 " "

However, there is no cause to believe that tuberculosis had quadrupled in Holland during the course of these years. Here, as in other abattoirs giving analogous figures, the principal cause for the increase reported is the fact that in all countries the veterinarians in the slaughter houses give each year greater attention to the slight cases of tuberculosis, which are so extremely frequent. In the abattoir of Rotterdam, in 1896, 4 per cent. of the cattle were tuberculous, and at Leyden, 4.7 per cent.

England.—It is generally admitted that the tuberculosis is very extensive in England. Thus, McFayden says that if one decided to seize all butchers' beasts in which tubercular disease is found, it would lead to the confiscation of nearly 30 per cent. of the cattle from the best dairy races. Even in 1847, Mr. Hunting at the autopsy of three to four thousand cows, found about 20 per cent. tubercular, and McFayden states in his journal that during the last two years, out of 4,379 cattle (for the most part

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apparently healthy from different parts of Scotland and England) 31.7 per cent have reacted to tuberculin. The most ample statistical information in regard to the extent of tuberculosis in England is found in the reports upon the slaughter of cattle suspected of pleuro-pneumonia. Thus, in 1891 out of 10,000 cattle slaughtered, 12½ per cent. were found to be tuberculous; and in 1892, of 3,600, about 22 per cent. This agrees with the figures obtained in 1895 and 1896 from dairy cattle killed in Liverpool, in which case 10.6 per cent. of 4,321 animals slaughtered were found to be tuberculous. In the slaughter houses in Manchester, out of 367 cattle killed, 29 4 per cent were tuberculous.

Denmark.—The statistics of the Copenhagen slaughter houses show in the years 1888 to 1895 an increase in the percentage of tuberculosis from 16.28 per cent. to 29.66 per cent; but there is no doubt that this is especially due to the experience and the increasing attention given by the veterinarians to slight tubercular affection. In the last few years, the rate of increa e in the percentage of tubercular animals is not quite so high. In 1896, 25.31 per cent, in 1897, 26.87 per cent. Numerous tuberculin tests made in Denmark since 1893 have, however, furnished ample information upon the increase in tuberculosis. Thus, up to June, 1898, tuberculin tests applied to 224,969 cattle on 7,898 estates, gave 28 8 per cent of reactions; and herein there is complete agreement with the figures obtained from the German Quarantine Stations, where in 1897, 29.4 per cent of reactions occurred in 68,575 cattle imported from Denmark. The ample information, early gathered in Denmark, has without doubt caused some authors to believe that tuberculosis has had an extraordinary extension in that country; but the information furnished from other places shows that there is no reason to believe that the statistics will be more favorable for most of the other civilized countries, when they publish the reports of an equal number of tests.

In Sweden.—During the past year, the results from testing 35,992 cattle on 1,117 farms showed 42.2 per cert. of typical reactions, and 5.2 per cent. of doubtful cases. In the German Quarantine Stations, in 1897, out of 6,238 Swedish cattle, 46.9 per cent. reacted. While tuberculosis seems to be no less extensive in Sweden than in Denmark, the figures from *Norway* are without doubt much more favorable. Here, out of 30,787 cattle tested upon 2,197 farms, only 8.4 per cent. gave reactions. This is easily explained when we remember that in this country the importation of foreign cattle has been relatively insignificant. It is also interesting to note that in Norway, the race of Ayrshire cattle are more tubercular than others, being about 18 per cent. In grade cattle, especially Ayrshire grades, the percentage of tuberculosis was 10.4 per cent., while the cattle of Norwegian origin have only 6.1 per cent. reactions.

America.—In the Eastern States of the great American Republic tuberculosis seems no less extensive than in Europe. Thus, in Massachusetts, in 1894, out of 3,295 cattle tested with tuberculin, 24.58 per cent reacted; but in 1895 to 1897, upon some farms there were found respectively 27 per cent., 54 3 per cent,, and 52.5 per cent. of reactions. In Connecticut, in the same year, out of 6,304 animals tested, 14.2 per cent. gave reactions. In districts containing the larger towns, the percentage of tuberculosis was 28.4 to 29.4, whilst in the district less thickly populated, the average was 9.9 per cent.

In Canada, out of 502 animals tested, 160 (or about 22 per cent.) reacted. (F. C. Harrison).

In Australia also tuberculosis seems to be wide-spread. From official communications, we learn that in 1884 to 1885, there were in the Colony of Victoria 7 per cent reactions, and in 1896, 4 per cent. In the years 1894 to 1896, the inspectors examined (but not by means of tuberculin) 1,024,800 cattle, of which 1,734, or .17 per cent., were condemned because of tuberculosis. It is remarkable that in Victoria, cattle affected with tuberculosis are slaughtered and no indemnity is given to the proprietors: and Sinclair, representing the Agricultural Department of Victoria in England, declares that this measure does not excite ill feeling amongst owners.

These figures will suffice to show that bovine tuberculosis is an extremely widespread disease; but there does not seem to be any ground for the idea generally entertained that the disease is spreading at an ever-increasing ratio. No one, says Bang, is justified in deducing such a conclusion from the statistics of the abattoirs. In some localities, he says, there is a decrease; because in the last twenty years the farmers have begun to recognize the fact that there is nothing to gain from leaving tuberculous animals in the stables until they are ready to die. This is also the place to emphasize the fact

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that it is not necessary to be very much frightened by the large figures of reactions obtained in tuberculin tests, because the immense majority of affected animals are so only to an insignificent degree, having perhaps only a few small nodules of tubercular matter in one or other of the lymphatic glands. These animals, as Theo. Smith very well expressed it, "are infected but not diseased." In many such animals the disease never develops. It remains stationary for years, and one can even say that it cures itself, the nodules in many cases becoming smaller and calcifying. I know several cases in which animals gave typical reaction, and at the slaughter-house five years later only a few calcified nodules containing bacilli in a lymphatic gland were found in these animals. It is clear that such animals are in no sense dangerous, either to other animals or to mankind. They are not capable of spreading the infection, and no reasonable man need fear to drink their milk or eat their flesh. In this a very great change of opinion has recently taken place, because at the first congress on tuberculosis, held ten years ago, it was decided that the meat of all tubercular animals should be condemned.

Again, in Germany 92 per cent. of the animals recognized as tubercular at the abattoirs are eaten, five per cent. to six per cent. are sent to the Freibank and only two per cent. to three per cent. are condemned as unfit for use.

In questions of so great practical importance it is especially necessary not to exaggerate It is well to know the enemy, but not to attribute to him chimerical strength

On the other hand, it is quite certain that bovine tuberculosis causes very great losses, even under regulations such as are applied to butchers' meat in Germany. Siedamgrotzky calculates that the loss from this cause amounts to about six and one half million marks ($1,625,000) per year. Added to this are the great but incalculable losses caused by the lack of growth in animals badly tubercular, which give no return for the food consumed, and by the fact that on account of this disease one is so often obliged to slaughter cows even before they reach their best as milk producers. The industrial losses in many of these cases are very large. Thus the nations have the best of reasons for fighting bovine tuberculosis vigorously and persistently, even if nothing but the losses in wealth (economic losses) are taken into account. But, as is quite natural, when fighting this disease we are more concerned with the danger to the health of mankind from using tuberculous milk and meat than with the economical losses.

Danger from Meat.—The danger from meat has, we think, been greatly exaggerated. Meat itself is very seldom the seat of tuberculosis, and in the lymphatic glands which are found in the meat it is very rarely that tuberculosis is found, unless the disease has become general throughout the carcase, and it is only in the last stages that the bacillus enters the blood. In the great majority of cases, in which the disease has a local character, there is no reason to believe that either the meat or he the lymphatic glands will contain the bacilli. We must, of course, admit that there is a possibility of bacilli entering into the blood stream from a local centre, in which case the blood in the muscles would contain the virus, but the probability of this happening is small, especially in the numerous cases of slight tuberculosis Hence the German system of restricting the total seizure of generalized tuberculosis, delivering the slight cases to free consumption after having taken away the diseased organs and permitting, under certain conditions (Freibank system or sterilization), the sale of the more advanced cases, seems to me worthy of recommendation. In Denmark we have not the Freibank system, but the meat of all the diseased animals is examined and classified by the use of two marks, one indicating that the animal has been absolutely healthy or has only an insignificant local tubercle and the other that the meat may be eaten, but advising the people to cook it thoroughly, In some towns the system adopted in Germany is also followed, the carcasses affected to any considerable extent being sterilized. Several investigators have directed their attention to the danger of contagion from the butcher using upon meat, knives or other things soiled more or less with tubercular products. This danger undoubtedly exists, and it is necessary to guard against it as much as possible in slaughter-houses, but, for the most part, where meat is properly cooked, the danger is almost nil, for even an incomplete cooking will destroy the bacilli deposited upon the surface of meat. Thus the question of protection against the transmission of tuberculosis by meat is not a difficult one where the control of the meat market is based and exercised upon rational principles, and the inspection and control of all meat offered for sale is one of the greatest importance as a protection against septic diseases and parasitic maladies.

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Danger from Milk.—Much greater is the danger from milk, because it is generally drunk uncooked. It also forms the essential food during infancy; and the danger of infection through the digestive canal seems to be greater in children than in adults. Tubercular deposits are not unfrequently found in the udder where the milk is formed.

We know that the milk secreted by a tuberculous udder contains a large number of tubercle-bacilli; and the danger of infection from such milk is all the greater, because tuberculosis of the udder develops without causing any change in the appearance of the milk. Hence the milk is used without scruple; and here is a great danger.

What is the frequency of mammary tuberculosis? It is yet difficult to give a decisive answer to this question; but in Saxony, in the years 1888 to 1896, from 1 to 2.3 per cent. of all tubercular animals slaughtered had mammary tuberculosis. In Copenhagen mammary tuberculosis seems to be met with less frequently. In the years 1888-1892 only 167 cases of mammary tuberculosis were found in the public abattoir, out of 301,668 animals slaughtered, of which 17.2 per cent. were tubercular. According to these figures three per cent. of the animals slaughtered had tuberculosis in the udder. But these figures have no great value because it is not known how many of the animals were cows. Moreover, it is also true that, in many of the abattoirs, a large number of cases of slight mammary tuberculosis escape detection. During the year 1898 (April) to 1899 (March), 347 cows affected with mammary tuberculosis were slaughtered in Denmark. When the udder is not affected the milk but rarely contains the bacilli of tuberculosis. At the third congress on tuberculosis, Nocard affirmed that in all the cases in which milk contained the bacilli there were special lesions in the udder; and it is quite probable that this assertion is true; but the question is of more than theoretical interest, and it is necessary to avow that we sometimes find tubercle-bacilli in milk without being able to demonstrate clinically any alterations in the udder, that is when with the naked eye, at least, we cannot detect any trace of unhealthiness in the udder.

At a recent congress on hygiene I communicated the results of my researches on this subject, stating that by injecting milk from 63 badly tuberculous cows into guinea pigs and rabbits I produced tuberculosis in nine cases, or 14 per cent. of the total. The udders of all these cows were clinically healthy. A post mortem examination, however, revealed small deposits in the glands of some, but nothing in others. In some of the above cases the cows were affected with miliary tuberculosis; and whether the germ is present in all cases of microscopic alterations of the udder or not, we are undoubtedly justified in concluding that an udder apparently healthy (that is, showing no external signs of disease or ailment of any kind) does not give infectious milk, unless the cow is affected with generalized tuberculosis, that is to say, unless the bacilli are circulating in the blood. The milk of cows affected with localized tuberculosis, without lesion in the udder, is then practically innocuous. Eber, however, has directed attention to the fact that it is easy for milk secreted by a healthy udder to be infected with tubercle-bacilli in a stable where tuberculous animals are kept. Animals having lung tuberculosis eject more or less infectious (or bacillus-laden) matter by coughing and afterwards swallow the greater part of it; so that some of it may go directly into the air and other portions into the stomach and out through the intestines, defiling the manure; and in milking, the milk is very often soiled more or less with particles of manure, straw, dust, etc, all of which are liable to be infected with bacilli from the lungs or evacuations of animals that may be suffering with this form of the disease. Milk from such a stable is likely to contain bacilli, even though pure when drawn from the udder; and the danger is greater if the animals affected have tubercular ulcers in the intestines. I think there is good reason for maintaining that there exists here a very important source of milk infection; and it is possible that this fact explains the frequency with which milk seems to spread contagion; for we do not understand how all the infection of milk with tubercle-bacilli can be due to the two causes usually assigned, viz., tuberculosis of the udder and advanced generalized tuberculosis.

To prevent, as far as possible, the danger cited below, it is necessary to keep the stable and the cows themselves as *clean as possible*, and to put the pails [before and after milking—until they are removed altogether] outside of the stable, in some spot or small room where they will not be soiled with particles of manure, &c., which float as dust in the air of the stable; and animals known to be diseased should never be kept in the same

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stable with healthy animals. Not only are the other animals in great danger of being affected, but the milk also is in danger of becoming diseased.

The danger to which man is exposed in using milk can easily be removed by boiling, as is usually done in preparing food for children. But some persons have a great aversion to cooked milk; and, on account of these, it is necessary to recommend the use of milk which has been pasteurized. By heating for a short time to 85° C. (185° F.), the bacilli of tuberculosis are killed; and if the milk is cooled down immediately afterwards, there will be very little of a cooked flavor to trouble any one. Establishments founded upon this principle prosper well in Copenhagen and other cities.

In the same degree as man, cows and pigs are exposed to the danger from milk and also whey and butter-milk. Experiments made in Germany, in Denmark, and in other countries, have clearly proved that this source of contagion plays a very important role; for where milk from different farms is handled in factories, there is great danger of tuberculosis spreading to other farms in skim milk which is a mixture of the milk from several farms,—and some or it perhaps from cows which are badly affected with tuberculosis. To avoid this danger, the Danes have for some time past been heating to a high temperature all skim-milk sold or otherwise disposed of at creameries; and in 1899 a law was passed forbidding any dairy, creamery, or factory to sell or return to the farm any skim-milk or butter-milk without having previously heated it to 85° C. (185° F). Without doubt, this measure will prove of great benefit, especially when there has been furnished a simple means of finding out whether or not the milk has been heated to a temperature at least very near that which is demanded. Such a method has been furnished by Prof. Storch, who has shown that when a drop of solution of hydrogen peroxide and two drops of a watery solution of 2 per cent. of paraphenylendiamin is added to a small quantity of milk, a blue color is produced if the milk has not been heated to a temperature of 80° C. (176° F.), whereas milk retains its natural color if it has been heated to a higher temperature. In a word, then, we may say that boiling or thorough pasteurization is a sure protection against contagion from milk.

Precaution against infection from the bacillus in butter is less frequently taken than in the case of milk. When cream is separated by centrifugal force, it is no doubt freed from the greater number of tubercle-bacilli which it may contain, but some of the bacilli remain in the cream; and in the last few years several investigators have shown that butter sometimes contains tubercle-bacilli. In some of the published experiments on this point, the tubercle-bacilli have been confounded with other germs shown by Rabinowitsch to resemble very much the tubercle-bacilli; but it is certain that butter may contain the true microbe; and, happily, we have evidence to show that one may produce excellent butter from cream which has been heated to 85° C. (185° F.). During a number of years, this (the heating of cream to 85° C.) has been commonly practised in Denmark; and the new law directs that this method be always followed. This law requires that the butter-milk also be heated to 85° C.; and as a consequence nearly all cream will be heated to the prescribed temperature, because by so doing the difficulty of heating the butter-milk will be avoided. The new law contains another important provision, viz., that the slime deposited upon the bowl of the centrifuge must be burned,—important, because it is certain that this slime nearly always contains, besides filth of various kinds, a quantity of tubercle-bacilli; and it has been shown by experiments in Denmark and Germany that this slime when put into the food of pigs has infected them with tuberculosis

Recognizing the fact that it is mammary tuberculosis which involves the chief danger of contagion in milk and dairy products, Denmark has started a fierce and determined war against this disease. The law of March 26th, 1898, requires that every cow affected with tuberculosis of the udder be killed and an indemnity given to the owner, amounting to one-quarter of the value of the animal as meat, and to three-quarters if the meat is declared unfit to be used as food for man, which is generally the case. This law is now in force and has already led to the slaughter of several animals. It is made the duty of the veterinary surgeon to send a sample of the secretion of the diseased gland to my laboratory for examination; and, if tubercle-bacilli are found, an order to kill the cow is at once given. A similar law has been passed in Sweden within the past year, and in several other countries the law has been recommended; but in spite of this measure and of the efforts to secure the cooking or the high heating of milk and cream

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and greater cleanliness in stables, there should also be frequent examination and regular veterinary control of all cows furnishing milk for sale. In the large company furnishing milk for Copenhagen (Kjöbenhavn Maelkforsyning), all the cows are examined twice a month by veterinarians; and, if a cow is declared to be suffering from tuberculosis, she is at once isolated. Several other companies within the past year have made similar regulations. Although these measures do not give an absolute guarantee against the putting on sale of tubercular milk, they considerably diminish the danger. It is very evident that the best method we have for stopping the infection of man from cattle is to exterminate bovine tuberculosis; and we have already said that very great advantages would result to society from the adoption of this method. But is it not absurd to speak of the extermination of this disease, so widespread in all countries? It is certain that it would be very difficult; much more difficult than exterminating the other diseases of animals which are more contagious, *e. g.*, bovine pest and aphtic fever. The difficulty consists not only in the prevalence of tuberculosis—so widespread in nearly every country—but also in its progress, so chronic and so clandestine. For this reason it is much more difficult to see what will happen than when dealing with pleuro-pneumonia. We can, however, gain some encouragement from the fact that in the last twenty years the latter disease has been exterminated in countries where it has been widespread, *e.g.*, Holland and England. With tuberculosis, there would still be this difficulty, viz., that the disease exists, not only in cattle, but in other animals and in man. Other animals, however, do not play so important a role as tubercular cattle; and there is no reason for believing that cattle are often infected by mankind. Without doubt there have been cases where butchers or milkers affected with tuberculosis have infected cattle by their expectorations; but well authenticated cases of this kind are rare. In the immense majority of cases it has been proved that tuberculosis has been introduced into stables by tuberculous cows; and we can demonstrate the propagation of the disease from a single badly tuberculous cow to its neighbors, and from the stall formerly occupied by a diseased animal. Also the fact that numerous farms are quite free from tuberculosis in countries where tuberculosis in man is widespread is at variance with the supposition that man plays an important part in the infection of cattle with this disease. Thus I have shown that in Denmark more than one-fifth of all the farms examined are quite free from tuberculosis; and there is no doubt that in other places the cattle which are diseased have not been in contact with tubercular men, but generally with diseased animals which have been brought to the farms. The situation in Norway enlightens us still more upon this point. There, human tuberculosis is not more rare than in Denmark; but bovine tuberculosis is much less extensive. The same thing seems to be indicated by the growing propagation of tuberculosis in many countries during this century, whilst tuberculosis in man seems rather to be diminishing, especially in the last twenty or thirty years of the century, *e. g.*, the statistics of Massachusetts have shown a diminution of fatality from phthsis from 4.2 per cent. in 1853 to 2.2 per cent. in 1893; and in Glasgow from 4 per cent. in 1860 to 2.4 per cent. in 1890 to 1894. Theobald Smith has also communicated the results of some interesting experiments on the infection of cattle by cultures of the bacillus of tuberculosis from cattle and from man. It was found that the former produced a much more virulent form of the disease than the latter; and he draws the correct conclusion, that the expectoration from tubercular men cannot be considered as seriously dangerous to cattle. If, then, there is some danger of bovine tuberculosis coming from tubercular man, it is small; and we ought, nevertheless, to increase our efforts to exterminate the disease in cattle; and that it is possible to do so I am fully convinced; but, without doubt, only after long years of combat and great sacrifices. Tuberculosis is a disease purely contagious. We know the nature and vital conditions of the virus. We know that tubercle-bacilli are present in the evacuations of diseased animals and men, and that they can live for a long time in obscure and narrow places; but we have means of destroying them in such places. We know that they are found in great quantities in stables where tubercular cattle live; but we know also that they are not found in all stables; on the contrary, there are in all countries many stables that are exempt. We know that a very large number of herds are infected where the disease has reigned for many years; but we know also that the large majority of infected animals have only local and insignificant lesions, and that the immense majority of cattle are born healthy, even in diseased herds; and in order to keep them healthy, *we need only to protect them against bacilli in the milk and in the stable.*

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Formerly, there was no possibility of exterminating bovine tuberculosis, because there was no means of detecting its existence in the great majority of cases. We could diagnose the disease only when it was far advanced; and when animals exhibiting external signs of the disease were removed from the farm, there remained many that were already affected, and many in which the disease would continue to develop. The removal of the worst cases of contagion, no doubt diminished the ravages of the disease; but it was impossible to exterminate it in this way. It was the discovery of tuberculin by Koch that created the possibility, by giving us a means of detecting tuberculosis in the earliest stages and in the least insignificant degree. The numerous tests made in nearly all civilized countries have shown that in most cases, tuberculin is an excellent means of determining the existence or non-existence of the disease; but it gives us no information as to the degree or extent of the infection. When tuberculin produces a typical reaction, we are pretty safe in concluding that there is more or less infection somewhere in the body of the animal. The cases in which an attentive examiner has not succeeded in finding it are rare; and I am lead to believe that, in spite of the trouble taken, some lesion has escaped his notice, and that it is hidden in some particularly inaccessible spot. We cannot of course, deny the possibility of an occasional short or temporary fever resembling that produced by tuberculin but arising from other causes; but such cases are very rare, and the error committed in condemning such an animal as tuberculous is without practical consequence.

What is worse is that the tuberculin somtimes fails to discover the existence of advanced cases of the disease. It undoubtedly reacts on old, insignificant deposits, calcified for the most part, and in cases where the disease is stationary, and often perhaps in process of healing, which deposits would perhaps be incapable of expelling the virus. But we must admit that there are unfortunately not a few cases in which it fails to provoke a reactionin highly tubercular, and hence very contagious, animals. This is the reason why we should never fail to have recourse to a careful clinical examination, when an animal, without giving a reaction, exhibits symptoms which seem to suggest the existence of the disease. There is also the difficulty that repeated injections generally result in producing immunity in an animal which may have given one or more reactions. Such immunity is sometimes transient, but, nevertheless, a reality. It is true also that the phenomenon is very inconstant; but it often leads to imposture in commercial transactions. In reference to experiments made on the farm at Thurebylille, I may remark that several animals which, on account of a tubercular reaction were placed in the diseased stable, did not react at a later date, while, when slaughtered, all these animals were found to be affected with tuberculosis, but most of them in only a very slight degree. Here the acquired immunity has been of no practical consequence; but it is well to know the fact, because these renewed tests in a reacting section may lead to wrong conclusions, although the lack of reaction by the renewed test, after some years, undoubtedly indicates that we often have a stationary or retrograde case of tuberculosis to deal with. One cannot, however, rely absolutely on this, as the lack of reaction may be due to a very advanced and extremely contagious form of the disease. I think that it is better not to retest animals that have once reacted in a typical way, but to trust to the first test.

It is necessary to mention yet another fact which throws doubt upon the results of some tuberculin tests. Whilst the test gives a relatively certain result upon animals which remain quiet in the stable, with their accustomed surroundings the result is not so certain or reliable when the animals being tested have just come in from a journey, have been exposed to the market, or otherwise excited. In such cases, many animals fall into an abnormal state, in which they do not act or react as under other circumstances. In some instances of this kind they give no reaction at all, even though diseased. McFayden has lately called attention to this fact; and we are informed that experiments bearing upon the point have been made in Massachusetts by procuring from the markets of Brighton and Watertown animals absolutely healthy and subjecting them to the tuberculin test. In Denmark there have several times been reactions in healthy animals injected under such conditions. It is, then, necessary to be very careful and prudent in buying animals furnished with a certificate of having been subjected to a cattle dealer's tuberculin test and found healthy. Serious mistakes may be made even when the seller has no intention of deceiving the buyer. It is always advisable to see or know that cattle are rested several days before they are tested.

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Thus, in citing the imperfections of tuberculin as a means of detecting tuberculosis, I may note that some of them are not of great practical importance, and that others may be neutralized, if one knows how and where to look for them. In spite of these defects tuberculin constitutes a very important factor in diagnosing bovine tuberculosis; and, if properly used, is of great service in our combat against the disease. Thus, *the propositions made during the last few years for fighting bovine tuberculosis, and the experiments conducted in the different countries, have all, as a foundation, the application of tuberculin as a diagnostic means.* Let us examine the most important of them.

The most radical procedure was that which was followed in Massachusetts in 1894, where all tuberculous animals were slaughtered as quickly as possible. Before that time inspectors had been appointed in all cities and towns in the state to examine the animals destined for the butcher or for milk production. These inspectors, of whom only one-seventh were veterinarians, were charged with the examination of all animals in the state, twice a year. When they were suspicious that an animal was tubercular, or had some other contagious disease, they put it into quarantine and informed the Board of Cattle Commissioners. All animals suspected of tuberculosis were tested with tuberculin; and those which reacted were slaughtered at once, and half their estimated value paid to the owners. The slaughter houses were carefully watched, and all tubercular carcasses were confiscated. The Commission, however, soon learned that by this method they discovered only a portion of the tubercular animals; so they decided to make a systematic tuberculin test of all the animals in the state. They commenced by taking three districts of uniform size, near the coast, with the understanding that the other portions of the state should be taken, each in its turn.[9] At the same time, they endeavored to prevent the importation of tubercular animals, testing with tuberculin all cattle imported into the state and enforcing regulations compelling cattle owners to test all cattle offered for sale upon the market. Cattle found healthy by the tuberculin test were furnished with a mark, burned in with a red-hot iron. In less than a month, the sum of $150,000 was spent upon these measures; and the immediate outcome was a strong agitation against the work, chiefly on account of the enormous expense: so, in 1895, only $100,000 was granted for the work; and it was decided to apply the tuberculin test only, (1) upon cattle imported from other states, (2) upon those cattle of the state declared tubercular by a competent veterinarian after a clinical examination, (3) upon suspected animals when a written request was made by the owner, and a promise made by him that he would comply with all conditions laid down by the Commission. For diseased animals entire indemnity was given, but only up to $60 in value. During the following years, the sum annually granted for the work was increased to $250,000; and, in 1897, a stipulation was made that compensation should be given only when the test was made by the State Board of Cattle Commissioners, and not by private veterinarians. The proprietor was required also to disinfect his premises and not to introduce into his stables any animals which had not been tested.

At the Veterinary Convention at Nashville in 1897, the secretary of the Commismission, Mr. Parker, announced that during the past year very good results had been obtained in the surveillance of herds by the inspectors of the Massachusetts Commission. He reported the lessening of the malignant forms of tubercle and of the danger from drinking tubercular milk. The report is supported by the following figures:

In 1895, 2,398 cattle were slaughtered, of which 784 (or 32.6 per cent.) were affected with generalized tuberculosis; in 1896, 4,173, of which 1,051 (or 25.1 per cent.) had generalized tuberculosis; and in 1897, 5,062 were slaughtered, of which only 183 (or 3.6 per cent.) were affected with generalized tuberculosis. In its last report, however, published in January, 1898, the Commission does not conceal the fact that, in spite of the above results, but little diminution in bovine tuberculosis had been made, although, during the last few years, one quarter of a million dollars per year has been spent in fighting the disease in the State, the total number of animals in the State being about 250,000 (in 1895, it was declared to be 223,636). The cause of these meagre results from such great effort seems to be, that, so far, most of the money spent has been used in paying indemnities for slaughtered animals; and on this account, other efficacious methods of preventing the spread of the disease have not been resorted to. In 1897 the compensation for he animals slaughtered amounted to $185,448. The Commission very correctly remarked hat on some farms there always remained some animals slightly affected, among which

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the disease gradually developed in the course of time, so that the following year it was necessary to slaughter perhaps as many as after the first test. It even seems that the liberal compensation has tempted people to buy suspected animals, and thus make profit out of the State. For this reason there was little money to dispose for other means, such as the testing of herds belonging to persons who truly desired to exterminate the disease.

Then, it has been shown that the cleansing and disinfecting of stables has not been thoroughly done; and the commission very properly insists that this is an indispensable supplement to the test. It seems also probable that the construction of stables in Massachusetts is bad. There are many complaints about lack of air, light and ventilation.

The great difficulty in a rational combat against bovine tuberculosis in the Eastern States arises from the stupid idea of the population that all butchers' beasts showing even the most insignificant signs of tuberculosis ought to be condemned. On account of the very large number of light cases of the disease, it is evident that even a smaller indemnity than that given at present will involve the expenditure of such enormous sums of money that there will not be much left for doing anything beyond the work of testing and slaughtering. From other parts of this interesting report of the State Commission, it seems that those who have had charge of the work have a very just conception of the whole question; so we have ground to hope that better results will follow. But, for the time being, we cannot say that the fight against bovine tuberculosis in Massachusetts has been successful.

The country in which there have been the most energetic attempts at fighting bovine tuberculosis by compulsory methods is Belgium. The plan followed there is essentially the same as that advocated by Nocard, and which was formulated according to the law of the 9th of January, 1895, known as the Law Gadaud. Only the isolation of all animals which react is more clearly and strongly insisted upon than in the French method.

Whilst in Massachusetts and Belgium, the first intention was to destroy all animals clinically affected, the system applied in Denmark, according to my initiative, by the law of the 15th of April, 1893, aimed only at giving the proprietors the best possible means of ridding themselves of the disease. I showed them that it would be possible for them to succeed by testing all their animals with tuberculin and making a separation, as complete as possible, between the reacting animals and the healthy ones, the state gratuitously furnishing tuberculin and paying veterinarians for making the test, on condition that the proprietor agrees to make the required separation. It is to these two points that the aid furnished by the State has been confined; and what has been asked of owners is very little indeed (only the complete separation of reacting from non-reacting animals). No order has been given to kill tuberculous animals It is only forbidden, (1) to take to market animals which are evidently (clinically) tubercular, (2) to sell such animals to no one, except the butcher, and (3) not to use or dispose of the meat of such animals except under veterinary control. Also the use or sale of milk from cows affected with tubercular mammitis, is prohibited. Reacting animals, as has been stated, have to be kept separate; but the owner is allowed to keep them as long as he wishes. Of course, it is to the farmer's own interest to deliver to the butcher as soon as possible animals clinically affected, but he is not obliged to do so. Besides, it is explained to him that in the majority of cases the infected animals are only slightly affected; that such animals can be used for many years; that the calves dropped by these beasts are healthy; and that they will remain healthy, if they are not exposed to contagion. This is the reason why it is necessary to take all calves away from infected stables immediately after birth, and to nourish them from the second day with cooked milk or with milk coming from healthy animals. The first day, they receive their mother's colostral milk. The owners are also advised to repeat, after a year, the tuberculin test upon animals which did not react in the last test, in order to remove as quickly as possible any animals that may have been infected, in spite of the separation, from reacting animals; and it is enjoined upon them to disinfect very thoroughly the stables where the healthy animals are kept, and not to use the same implements in the healthy section and the reacting section. As to the personnel, they are advised, where it is possible, to employ different persons in the different sections; and where this is not possible, to take the greatest possible care to prevent contagion, insisting on the use of different blouses, &c., and different shoes in the different sections. The sale of animals which are condemned by the test alone is not for-

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bidden. I desired that such animals should, at least, be distinguished by some sort of mark; but one can easily understand that such a demand would have discouraged almost all owners from testing their animals, especially at the commencement, when they did not generally understand the significance of a reaction in an animal. Had such animals been marked, it would have been impossible to obtain anything like a fair price for them, even for butcher's purposes. Further, as no indemnity is given, a wrong would have been done in placing upon the owner who used tuberculin, the task of ridding his farm of tuberculosis under much more unfavorable conditions than those who did not use it and who might, without interference, sell animals as tuberculous as his. It was necessary also to advise the farmer desiring to buy animals, of the need of guarding himself against the disease by testing all purchased animals before putting them into his stables.

It is this idea of *successive elimination of tuberculosis by means of separation and the raising of calves of reacting cows and as well as of absolutely healthy ones*, which I suggested at the Congress on Hygiene at Budapest in 1894. This method has since been adopted in several countries. First, in Norway, where, since the spring of 1895, tuberculosis has been fought after a plan resembling that of mine. The Norwegian regulations are better even than those of Denmark. The farmer, for example, is obliged to deliver to the butcher as soon as possible cows affected with mammary tuberculosis and animals extremely tuberculous, whose milk ought not to be used without cooking. Also animals which have reacted are distinguished by an ineffaceable mark, and can then be sold only to the butcher. The fact that it has been possible to execute such severe measures without giving any indemnity to the owner is, no doubt, explained by the relatively small amount of the disease in the country. The law for fighting bovine tuberculosis in Sweden also contains the principal provisions found in the Danish regulations. But the order for a complete separation between re-acting and healthy animals does not seem to have been enforced with the necessary rigor. In 1897, $5,000 was placed at the disposition of the Government to recompense owners who might fight the disease in a satisfactory manner. In Prussia, since the year 1896, the Government has induced several farmers to test their cattle for tuberculosis according to my method; and numerous tuberculin tests made in Bavaria seem also, for the most part, to have been made according to this method.

In Germany, several proposals for a more direct intervention on the part of the State, in the fight against bovine tuberculosis, have recently been considered, but their best men are still at a loss what means to adopt. Formerly a general meat inspection was established and the compulsory insurance of butchers' cattle.

In Prussia, the Chamber of Deputies has voted upon these two laws, whilst a law resembling, in its essential points, the new Belgian measure has been rejected. But it seems clear that besides the measures enforced by the law, cattle owners will be encouraged to fight against tuberculosis by means of the tuberculin test and the separation of the healthy from the diseased animals.

The English Royal Commission on Tuberculosis, 4th April, 1898, suggests that cattle owners be encouraged to fight against the disease, the state promising them a free tuberculin test, on condition, (1) that the test be made by a veterinarian, (2) that the reacting animals be separated from the healthy ones, and (3) that the cattle be kept in good sanitary surroundings; and, in order to avert the danger of contagion from meat and milk, the Commission advises the establishment of public abattoirs, and a general inspection of meat; also that every case of mammary disease should be reported to the proper authorities; and if it is found to be tubercular, the cow should be slaughtered and compensation given to the owner. It also proposes very strict and severe regulations for the disinfection of stables.

These, then, are the most important proposals made or adopted to combat bovine tuberculosis.

Which, then, ought to be considered the best? It is clear that the ideal method from the point of view of the veterinary police would be: 1. To discover all animals affected with tuberculosis. 2. To slaughter the most seriously affected, especially all those which have the disease in a contagious form, that is to say, those secreting the bacilli. 3. To separate completely the animals slightly affected from the animals which are healthy, and to slaughter the former as soon as the disease is much developed.

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Such a method requires a declaration of all cases of tuberculosis, even the slightest. Afterwards comes the clinical examination by a competent veterinarian of animals which have been exposed to contagion; then the tuberculin test and the separation of the reacting animals from the healthy ones.

But in proposing the ideal method, we meet this difficulty,—that tuberculin is not an absolutely reliable means of diagnosis. Upon a large farm where tuberculosis has been present for a number of years, there are introduced into the healthy section some animals which ought not to be there, because they are infected with a little latent tubercle. The most of these animals are inoffensive, but it is very possible that tuberculosis may develop in some individual amongst them; and what is not more impossible, is that some animal does not re-act, because of the great development of tuberculosis, and does not show any clinical signs of the disease. I make this remark to show that even the most radical procedure that can be adopted, that of killing all animals clinically condemned and those which re-act, does not free the herd from tuberculosis with absolute certainty and at a single stroke. Thus, the experience of Massachusetts furnishes us a very good example, even if the bad results obtained there are due in part to an insufficient disinfection of the stables. The most rational procedure would be to treat bovine tuberculosis in the same manner as pleuro pneumonia, that is, to slaughter all animals that have lived with tuberculous animals; but such a measure it would be impossible to carry out, except in cases where tuberculosis has been recently introduced into a country until then exempt from the scourge, and then there would remain the possibility of cattle becoming infected from mankind. It is, then, necessary to admit that, in most civilized countries where tuberculosis is at all wide-spread, the most perfect methods are more or less defective, and we must content ourselves to deal with the disease slowly and gradually.

What measures can we recommend? The reply to this question depends, first, upon the sum of money which is at our disposal. If one does not flinch at great pecuniary sacrifices, a procedure analogous to that adopted in Belgium in 1896 would be the best. We should have the certainty of knowing most of the cases of bovine tuberculosis, and the beasts causing the greatest danger in the propagation of the disease would be slaughtered, and the testing of all animals which had been exposed to contagion, and the separation between reacting and healthy animals. But the capital fault of the Belgian measure was the prescription of the slaughter of all animals re-acting in the course of the year. Even the measures against the sale of milk were too severe. On the other hand, the new Belgian proposals seem too easy, and there is not sufficient control of animals which have been exposed to contagion. But the fact that Belgium has found it necessary to modify, to such a degree, the first radical measures, very clearly shows the numerous difficulties of forcing the combat against tuberculosis. In countries where the Government does not vote enough money to give an indemnity for all animals clinically affected with the disease, I think that there is nothing better to do than to try to induce the farmers themselves to fight the disease by the same method as is practised in Denmark. It is true that this method requires a certain intelligence amongst the farmers, and that it can hardly be adopted upon farms which do not raise calves, but where the dairy cows are bought. But in all countries there are a large number of farms on which the Danish method can be followed with very good results. A few examples of this are given in the appendix. In considering the constantly decreasing number of re-acting animals and the excellent results obtained by the separation upon a large number of farms, I think that it is sufficiently proved that it is possible to lessen tuberculosis by the measures applied in Denmark. Until the present, these measures have cost the state about 350,000 crowns (nearly $90,000); but this sum is relatively small compared with the expense in Belgium and Massachusetts. I do not think that the Danish method is perfect. It has, however, been bettered by the law of 1898 (March 26th). In this law, the necessity of a complete separation is emphasized; and the provisions which require that all milk be heated to 85 degrees C, and that all cows affected with mammary tuberculosis be slaughtered, are essentially progressive points. By the giving of an indemnity for animals affected with tuberculosis in its contagious form (well-developed lung tuberculosis, tuberculosis of the intestines, and of the uterus), owners are encouraged to kill such animals as soon as possible.

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APPENDIX

Farm.	Date of tests.	Number of animals in the Reacting Section (Diseased).	Number of animals in the Healthy Section.	Animals in the Healthy Section which reacted at the second test.	The manner in which the separation has been made.
Thurbylille.	April, 1892....	131	77	....	The stable is divided by a wooden partition. The calf stable communicates with the healthy section. Separate personnel. The bad results of the test of April, 1898, can be explained by the fact that a very tuberculous cow, which was secreting a large number of bacilli, had been kept in the reacting section, and that the passage to the healthy section was by a way along which the manure of the diseased animals was carried.
	Oct., 1892....	....	77	7	
	May, 1893....	90	103	10	
	Oct., 1893....	....	107	1	
	April, 1894. ..	81	122	2	
	Oct., 1894....	....	119	1	
	May, 1895....	69	136	3	
	Oct., 1895....	....	132	2	
	May, 1896....	54	149	7	
	Oct., 1896. ..	....	147	7	
	May. 1897....	48	155	6	
	Oct., 1897....	....	157	2	
	April 1898....	42	172	16	
	Oct., 1898....	....	167	6	
	April, 1899....	44	183	12	
	Oct., 1899....	....	176	8	
Borup-Gaard.	Jan., 1894....	139	86	....	The stable is divided by a wooden partition, in which there is a door, which is opened only on rare occasions. Separate stables for the calves and heifers.
	Dec., 1894....	114	114	8	
	May. 1895....	....	117	1	
	Oct., 1895....	....	140	2	
	April, 1896 ...	....	148	14	
	Oct., 1896....	....	153	3	
	May, 1897....	....	184	5	
	Nov., 1897....	....	169	6	
	May, 1898....	....	186	2	
	Nov., 1898....	....	180	3	
	May, 1899....	....	208	3	
	Nov., 1899....	40	200	8	
I-stroep.	1895....	30	44	....	Stables separated by a corridor.
	1896....	....	58	1 (Which had reacted before.)	
	1897....	....	75	3 (Bought.)	
	1898....	....	108	5 (4 of which were bought)	
	1899....	....	108	3 (2 of which were bought)	
Tinglau.	1895....	46	15	....	Separate stables.
	1896....	....	36	2 calves	
	1897....	12	58	7 (1 calf)	
	1898....	4	67	6 (2 of which were calves, & 1 bought)	
St. A-gaard.	1894....	42	20	....	Separate stables.
	1895....	....	32	6	
	1897....	....	61	11	
	1898....	1	63	9	
	1899....	....	61	....	

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APPENDIX—*Continued.*

Farm.	Date of Tests.	Number of animals in the Reacting Section (Diseased).	Number of animals in the Healthy Section.	Animals in the Healthy Section which reacted at the second test.	The manner in which separation has been made.
Gaard i Moseby.	1896....	6	21	....	Partition.
	1897....	....	22	....	
	1898....	4	26	1	
	1899....	....	27	....	
Gaard i Fjenneslev.	1894....	7	13	....	Separate building.
	1895....	....	17	1	
	1896....	....	18	4	
	1898....	....	22	2	
	1899....	....	21	....	
F-Holm.	1893....	40	13	....	Until the summer of 1896, separation was very incomplete; but after the bad results in May, 1896, the stable was divided by a wooden partition. A number of the healthy animals have been stabled on a small farm.
	1894.	....	25	2	
	1895....	....	33	3 (1 calf)	
	May, 1896....	....	61	19 (3 calves)	
	Nov., 1896....	....	48	4	
	May, 1897...	27	59	7 (1 calf)	
	Nov., 1897 ...	....	68	4	
	Apr., 1898....	....	79	....	
Oerbak.	1895....	122	48	....	Division of the stable by a partition with door.
	1896....	....	66	6	
	1897....	....	75	3 (2 calves)	
	1898....	78	81	1	
Hessel-G.	1896....	181	79	.. ..	Separate stables.
	1897....	116	21	4 calves	
	1898....	108	148	8 (1 calf)	
	1899....	88	177	19 (5 calves)	
Gaard i Gureby.	1896....	19	3	....	Partition with door.
	1897....	16	11	....	
	1898....	8	15	1 calf	
	1899....	7	22	3 calves	

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ABSTRACT FROM LAW UPON MEASURES TO COMBAT TUBERCULOSIS.

The importation of foreign cattle must be only at the places mentioned by the Minister of Agriculture. Immediately after the importation of the animals, they must be put into quarantine stables, where the veterinary police are to test them, following the rules fixed by the Minister of Agriculture. The test must be finished not later than the fifth day after the arrival of the animals. After the tests, the animals which have not re-acted are to be put at the disposal of the owner, whilst animals which have re-acted are to be sent or conducted directly to a public abattoir, where they must be killed under the control of the veterinary police. The expense incurred in the quarantine stables and by the tuberculin test are paid by the State. Other expenses are paid by the importer. Animals imported for the butcher are exempt from this rule; but if exposed to a cattle market they must be sufficiently separated from the other cattle, and from this place must be led directly to a public abattoir. Butcher's beasts must be killed not later than the tenth day after their arrival.

Cows affected with mammary tuberculosis must be slaughtered under the control of the veterinary police or in the public abattoir. In compensation for the slaughter, the proprietor receives a sum equal to a quarter of the value of the meat of the animal at market price. For that part of the meat declared unfit for human food, the proprietor receives a further compensation of one-half the value of the meat seized, valued as before mentioned. That part of the meat declared fit for human food is put at the disposal of the owner. The indemnity is paid by the State. Dairies are prohibited from delivering for animal food, milk and butter-milk not having been heated to at least 85° C. Exceptions are made to this rule if an accident has prevented the heating; but this fact must be communicated to the person who receives the milk. The centrifuge slime adhering to the bowl must be burned. It is not permitted to import milk or butter-milk, unless, in the judgment of the Minister of Agriculture, these products have been heated to a temperature of at least 85° C. Under special conditions, the Minister of Agriculture is authorized to dispense with this prohibition. The enforcement of the law and regulations at the Customs and the inspection of factories, is by the veterinary police and by the inspectors for the control of butter and margarine, according to instructions from the Minister of Agriculture.

Infringements of these regulations are punished by fines of 10 to 200 crowns (about $2.50 to $50.00). In cases where interdicted merchandise is mentioned, it is confiscated, and heated to the degree described in the above paragraphs.

Respectfully submitted,

F. C. HARRISON.
Professor of Bacteriology.

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PART XI.

REPORT OF EXPERIMENTALIST.

To the President of the Ontario Agricultural College:

SIR,—I have the honor of submitting herewith my report of the work done in the Experimental Department during the year 1900. As there are a large number of valuable results of practical experiments in agriculture to present, I shall make this introduction very brief, and shall limit my remarks on each separate experiment to those points which seem to be of the greatest *general* value to the agriculture of Ontario.

EXPERIMENTAL GROUNDS. About fifty acres of land, divided into something over 2,000 plots is used for agricultural field experiments, conducted with varieties of grain, roots, tubers, hay, fodder, silage and miscellaneous crops; with artificial, green and farmyard manure; methods of cultivation, selection of seed, dates of seeding, etc.,—all with the greatest care and for several years in succession, in order to secure strictly accurate and reliable results. These experiments deal with the crops grown on over nine-tenths of the cultivated land of Ontario, that is, about 10,000,000 of acres.

CONDUCTING FIELD EXPERIMENTS The practical work in the Experimental department consists in laying out, seeding, and looking after the field plots, harvesting and threshing the grain; taking up, weighing, and storing the potatoes and roots; cutting and weighing the corn, etc.; and also in picking by hand the samples of grain grown on the plots, some to be sown on the plots the following year and some to be distributed for co-operative experimental work throughout the Province. But few people realize what a large amount of very careful thought is required in planning and supervising these experiments, and in studying and summarizing the results for presentation in reports, bulletins, newspaper articles and lectures.

INSTRUCTION TO STUDENTS. All first year students are taken to the experimental grounds in the Fall Term and in the class-room in the winter term, and the experimental work is explained to them. Besides this, the students of both the first and the second year help in the various operations of the department, for which they are paid from four to nine cents per hour. In this way our students become acquainted with many of the results of our field experiments, observing the advantages which come from cultivating and manuring the soil in certain ways, sowing seed of different selections, and growing the best varieties of grain, corn, roots, potatoes, grasses, etc. They also become interested in experimental work, and afterwards prove themselves our most successful co-operative experimenters on their own farms.

FARMERS CONDUCTING EXPERIMENTS. The system of co-operative experiments in agriculture which is conducted conjointly by the Experimental department of the College and the Ontario Agricultural and Experimental Union, is doing good service for the Province. In 1886, twelve of the ex-students of our college conducted practical experiments on their own farms and eight of this number furnished satisfactory reports of results obtained. From that date, there has been a steady and substantial growth of the co-operative work in argiculture, and this year there were three thousand three hundred and fifty-four ex-students and other Ontario farmers who conducted experiments at their own homes. For the results of the co-operative experiments, the reader is referred to the annual report of the Ontario Agricultural and Experimental Union, which is printed and distributed by the Department of Agriculture, Toronto, Ont.

CORRESPONDENCE The correspondence during the year has been heavy, the number of letters received having frequently been upwards of 600 per week. To give thoughtful answers to the letters which ask for information requires much work, but we believe that a great deal of good is being done through this correspondence. A very encouraging feature of the correspondence is. that we have learned by the letters received that the work of the department is appreciated by the farmers.

SPECIAL ARTICLES WRITTEN IN 1900. The following articles were written and published in Agricultural Journals and Ontario newspapers within the past year:

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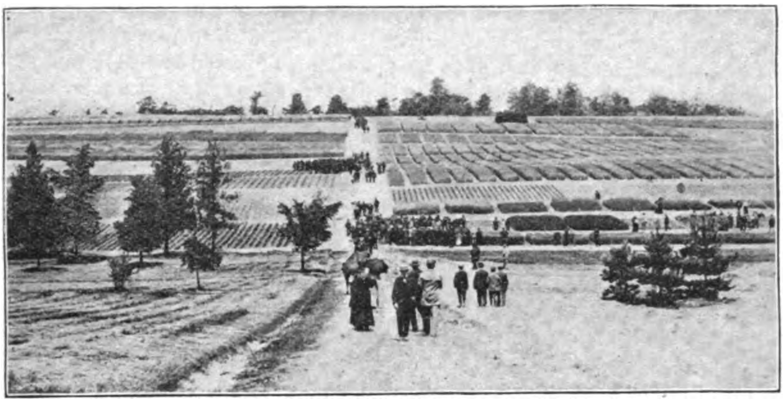
1. Co-operative experiments with spring crops for 1900.
2. Results of practical experiments in killing smut in wheat.
3. Lessons learned by excursionists when visiting the Agricultural College.
4. Seven years' experience with the Turkey Red variety of winter wheat at the Ontario Agricultural College.
5. Results of the Ontario Agricultural College experiments with winter wheat.
6. Results of experiments with winter wheat throughout Ontario.
7. The Ontario Agricoutural and Experimental Union.
8. Practical experiments with Spelt.
9. A brief report of the Meeting of the Agricultural and Experimental Union.



Excursionists Examining the Experimental Plots, June, 1900.

The Experimentalist explaining the plot work.
PRACTICAL FARMERS RECEIVING PRACTICAL INSTRUCTION IN A PRACTICAL WAY.

ADDRESSES. Besides the instruction given to the students in the regular course, addresses were delivered within the past year at the annual meeting of the Experimental Union, the annual meeting of the Dominion Millers' Association, the Central Dairy School, and Farmers' Institute Meetings at Shakespeare, Coldstream, Ailsa Craig, Parkhill, Desboro, Kemble, Annan, Leith, Bognor and Kimberly. Besides these, about fifty talks of from thirty minutes to two hours each were given in the month of June, when about twenty-five thousand excursionists visited the experimental grounds.

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TREATMENT OF THE EXPERIMENTAL PLOTS. The experimental grounds have a gentle slope towards the south-west, and the soil is what might be termed an average clay loam. About one quarter of the land is manured each year with twenty tons (twelve to fourteen loads) of farm-yard manure per acre. It will thus be seen that the land receives farm-yard manure once every four years No commercial fertilizers are used, except in distinct fertilizer experiments, which occupy from two to three acres each year, and on which tests are made to ascertain the comparative value of different fertilizers with different crops. The plots vary in size according to the requirements of the different experiments, and the yields per acre are determined from the actual yields of the plots in every instance.

RESULTS OF EXPERIMENTS. All our field experiments are conducted for at least five years before they are dropped. For the results of many of the tests which were carried on for five years previous to 1900, the reader is referred to former reports. The results of some of the experiments which have as yet been conducted for only one or two years are held back until the tests can be carried through another summer. As different seasons vary so much in temperature, amount of rainfall, etc, the average results of experiments continued for several years are of much greater value than those secured from only one year's work.

VARIETIES OF OATS.

Two hundred and twenty-seven varieties of oats have been grown in our experimental plots within the past thirteen years. The greater number of these have now been tested for five years in succession and definite data have been obtained each year regarding the height of plants, the strength of straw, the susceptibility to rust, the yield of grain, the yield of straw, the weight per measured bushel, etc, of each variety. As there are about two and a half million acres of Ontario land devoted to the oat crop each year, we have felt justified in doing a large amount of work, to find out the best varieties for the Province. Seed of promising varieties, therefore, has been imported from England, Scotland, Russia, Germany, France, New Zealand, Switzerland, and other countries, and both the foreign and Canadian varieties have been tested under uniform conditions.

The variety of oats which has given the best all round satisfaction, both at the Agricultural College and in the co operative experiments throughout Ontario, is the White Siberian, the seed of which was imported from Russia in the spring of 1889. The average yield per acre of the White Siberian for the nine years previous to 1900 was 86 3 bushels per acre, and the weight per measured bushel was 34.2 pounds. It possesses a long straw which usually stands up very well and seems specially suited to medium or poor soil. It is not quite so liable to rust as some of the other varieties, and the crops produced at the College have been comparatively free from smut. The grain is white in color, and is well adapted for the manufacture of oatmeal or for furnishing a good quality of food for live stock. The hull on the grain is comparatively thin, there being only about 30 lbs. of hull in each hundred pounds of grain. This variety is now grown extensively by Ontario farmers; in fact, it is one of the most popular oats in Ontario at the present time. One of its closest rivals is the Vick's American Banner, which has been grown in Ontario for some fifteen years. In the average of ten years' experiments, however, we find that the Siberian surpasses the Banner by an average of 5¾ bushels of grain per acre annually. It is also important to know that the grain of the Siberian weighs about three pounds per measured bushel more than that of the American Banner. In the results for 1900 the American Banner was surpassed by the Siberian by a little over sixteen bushels of grain per acre, and 2¾ pounds in weight of grain per measured bushel. The Joanette Black oats has given a larger yield of grain per acre than any of the other varieties of oats in the average of ten years' experiments. It possesses the shortest straw of all the varieties under experiment, and is, therefore, suitable only for sowing on land which naturally produces a large amount of straw. Four pecks per acre of the Joanette oats are usually quite sufficient, as it is a variety which stools abundantly The Oderbrucker from Germany, the Waterloo from France, the Probsteier from Germany, and the Bavarian from Ontario, are other varieties of oats which have made high records in the experiments at the College for ten years. The Black Tartarian oats, which used to be grown considerably throughout the Province, have given only average

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results at the College. The yield of grain per acre has been much less than that of the Siberian, and the straw is weak and very liable to rust.

Among the sixty-seven varieties of oats grown in the Experimental department in 1900, the largest yields per acre were produced by the Probsteier, White Siberian, Mennonite, Daubeney, Waterloo, and New Electric in the order here mentioned; and the lowest yields per acre were produced by the Vanhouten, Scottish Chief, and Black Irish, each of which gave less than one-half the yield of the former varieties. In weight of grain per measured bush., there were six varieties which gave upwards of forty pounds in the crop of the past season. These varieties were Whiteside, Early Dawson, Mortgage Lifter, White Dutch, White Superior Scotch, and Washington. We find that the varieties which give a heavy weight per measured bushel are usually only moderate yielders, and produce grain which is generally thick in the hull. Within the last few years we have secured some varieties of oats which are exceedingly early, and which ripen about the same time as our common six-rowed barley. The first varieties to ripen in 1900 were

A Farmers' Institute Excursion having lunch and listening to an address by President Mills before visiting the experimental grounds and the other departments of the College.

Alaska, Daubeney, and Black Mesdag, all of which ripened between the 24th and 26th of July. The Siberian and the American Banner each ripened on the 8th of August. Any farmers who wish to grow a mixture of oats and barley for the production of grain should select a very early variety of oats to mix with the common barley, or else secure some late variety of barley, such as one of the two-rowed kinds to sow with the standard varieties of oats, such as the Siberian and the Banner.

The following nine varieties of oats were grown in the experimental plots in 1900 for the first time, namely: Mennonite, Canadian Pride, Black Gotham, Irish Victor, New Sensation, Calgary Grey, Czar of Russia, Alaska, and the Princess. These yielded grain in the order in which the names are here given, the first named variety producing the largest yield of grain per acre. Each of these varieties, with the exception of the Princess, produced grain which weighed over the standard in weight per measured bush.; and four of

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the varieties, namely, Black Gotham, Alaska, Canadian Pride, and Calgary Grey, produced grain which weighed upwards of 36 pounds per measured bush.

Seed Oats from Different Latitudes.

Three years ago our experiment station sent seed oats of six different varieties to the experiment station in the State of Missouri. Arrangements are made by which the Missouri station and our own can exchange seed yearly, with the object of studying the influence of latitude on the production of oats for seed. In the spring of 1900 we received from the Missouri experiment station Southern grown seed of the same varieties which we forwarded to Missouri two years previous. The six lots of Missouri seed were sown beside the six lots of Ontario seed, and the results of the one year's test show that the Missouri seed produced the largest yield of grain per acre, and that the Ontario seed produced oats which gave the heaviest weight per measured bushel. This experiment will likely be repeated for several years until more conclusive results are obtained.

Six-Rowed Barley.

In our experimental work at the college within the last twelve years a large number of both six-rowed and two-rowed varieties of barley have been under experiment. The results show that for general purposes the six-rowed barleys have given much better results than the two-rowed barleys. Among the six-rowed barleys, which have been grown for a number of years in succession, the Mandscheuri variety from Russia has given decidedly the best general satisfaction. It produces a good length of straw, which usually stands well. The yield of grain per acre is excellent, and the weight per measured bushel is nearly always above the standard. As the common six-rowed barley is so well-known over Ontario, it will be interesting to compare the average results of this variety with that of the Mandscheuri, as shown from tests made with these two kinds under similar conditions for each of twelve years:

	Pounds per Bushel.	Tons of Straw Per Acre.	Bushels of Grain Per Acre.
Mandscheuri	51.1	1.9	66.8
Common six-rowed	52.7	1.6	57.9

Perhaps the closest rival of the Mandscheuri barley is the Oderbrucker variety, which was imported from Germany in the spring of 1889. In weight per measured bushel the Oderbrucker usually gives nearly two pounds more than the Mandscheuri, but the latter surpasses it in yield of grain per acre, and in both yield and strength of straw. The Mensury barley has produced about ten bushels per acre less than the Mandscheuri. Much has been said of late years regarding the variety known as the Success, which has the advantage of being very early, and of producing no beards. The weight of barley per measured bushel, however, is light, and the yield per acre is much less that of some other varieties.

There were nineteen varieties of six-rowed barley grown in the experimental department in the past summer. The average yield of the grain per acre and the average weight per measured bushel in the crop of the past year have been quite satisfactory. The varieties which gave the largest yield per acre were California Brewing, Four-rowed Canadian, and Six-rowed Baxter's Improved. The Oderbrucker produced the heaviest weight per measured bushel (54.6 pounds) of all the six-rowed varieties of barley. It will be seen therefore, that this variety retains its good reputation as a producer of grain which gives a heavy weight per measured bushel. The Oderbrucker, however, produced exactly one ton of straw per acre less than the six-rowed Baxter's Improved, and about one-tenth of a ton per acre less than the Mandscheuri The average height of the crop in 1900 was 45 inches for the Mandscheuri, 37 inches for the Oderbrucker, 41 inches for the common six-rowed, and 38 inches for the Success barley.

Only two new varieties were grown for the first time in 1900. These were the Ohio Beardless and the Champion Beardless. As is shown by the names, neither of these produce a beard. They are, therefore, similar to the Success in that respect. The Ohio Beardless gave one and a half bushels per acre more, and the Champion Beardless one

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bushel per acre less, than the Success barley. In weight per measured bushel, however. the Success gave one pound more than either of the two varieties grown this year for the first time.

Two Rowed Barley.

A two rowed barley is one which has two distinct rows of grain in the head. There are a great many varieties which belong to this class. We have grown in the experimental grounds a greater number of two-rowed barleys than we have of the six-rowed varieties. Of all varieties under experiment, however, it has been found that in the average results for several years the best two rowed barley has given about 14 bushels of grain per acre less than the best six-rowed variety. As upwards of fifty varieties of two-rowed barley have been grown in our experimental grounds, it will be seen that we have endeavored to ascertain whether there are any varieties belonging to this class which would be likely to give good satisfaction in Ontario. For general purposes, the six-rowed barleys have given the best results. In cases where a late variety of barley is desired to grow in combination with a medium ripening variety of oats, it is necessary to secure a barley that is slow in reaching maturity, and there appears to be no varieties so well adapted for this purpose as some of those belonging to the two-rowed class Of all the two-rowed varieties which have been grown for several years in succession, the following have given the largest average yields of grain per acre, namely New Zealand Chevalier, Gold Foil Hansford's, French Chevalier, Empress, Two-Rowed Canadian, and Kinna Kulla. The Duckbill variety, which is perhaps one of the best known two-rowed barleys in Ontario, stands twelfth in the list in yield of grain per acre. In weight per measured bushel there are but few of the two rowed varieties which stand higher than the Oderbrucker, which is a six-rowed variety already referred to.

The results of the two-rowed barley in 1900 were rather better than usual, as a few of the varieties belonging to this class gave higher yields than many of the six-rowed varieties. Those giving the highest yields of grain in the past year were Two-Rowed Canadian, Duckbill, Vermont Champion, and Jaramn's Selected Beardless.

Only one variety of the two-rowed barley was grown in 1900 for the first time. This was a variety which we received under the name of Golden Grain. As the seed of this variety did not reach us until a little late in the season, the seeding did not take place until a few days after the other varieties were sown. The results from this variety so far have not been very satisfactory.

Hulless Barley.

The Hulless barley usually weighs about 60 pounds per measured bushel, while the standard of common barley is only 48 pounds per bushel. There is a marked variation in the different varieties belonging to this class, some possess heads having two, and others having six rows; some are beardless and others are bearded; some are white, and others are black, and still others are purple; and some possess very weak straw, while others possess straw of medium strength.

The Guy Mayle, Purple, Black Hullese, Large Skinned, and Hungarian are the varieties which have given the largest yields of grain per acre among twelve varieties which have been grown for several years in succession. None of these varieties, however, have given nearly so many pounds of grain per acre as the Mandscheuri variety of the six-rowed barley. The Guy Mayle variety, which stands at the head of the list in yield per acre, produces a grain of purple color, and straw which usually stands fairly well. Perhaps the best known variety in Ontario belonging to this class is the Black Hulless. This variety produces a good yield of grain which gives a heavy weight per measured bushel, but usually possesses a very weak straw. The New White Hulless possesses a stiffer straw than the black variety, but is a much lighter yielder of grain.

Twelve varieties of hulless barley were grown in our plots this year, and of this number the Guy Mayle and the Black Hulless were the largest yielders of grain. In weight per measured bushel, however, the Purple and the Black Hullness came the highest, producing grain which weighed 64 and 62¾ pounds per measured bushel respectively. No new variety was grown on the plots for the first time since 1899.

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Spring Wheat.

There are still about 400,000 acres of land in Ontario which are used anually for the growing of spring wheat. Even though spring wheat is not grown in some sections of the Province, it must be remembered that in others it forms one of the regular crops of the rotation: and in those sections where it is grown most largely, it is important to secure those varieties which prove to be the most reliable for the average season. In order to obtain this information we have had under experiment as many as one hundred and thirty-eight varieties of spring wheat within the past twelve years. Many of these have now been grown for over five years; and in the average results of the experiments for several years we have found that the "Wild Goose" has given decidedly the largest yield of grain per acre among all the varieties which we have grown. This variety produces very hard grain, of coarse quality, which is difficult to grind. Both the flour and the bread made from Goose wheat, although of good quality, has a yellowish appearance. As it is a desirable variety, however, for the manufacture of macaroni, there has been a considerable demand in Italy and France for the Wild Goose wheat within the past four years. One firm alone in Toronto exported in all about 600,000 bushels of the Wild Goose spring wheat in 1899. About one half of this went to Italy and the other half to France. It is estimated that nearly 90 per cent. of the Wild Goose spring wheat which is shipped from Canada is used for the manufacture of macaroni. The price of the Wild Goose for export purposes will likely vary somewhat from year to year, as our keenest competitors are Russia, India, and Turkey. If the crops of these countries are good, the quantity which is shipped from Canada is correspondingly reduced. It is thought, however, that there will be a good demand from the Mediterranean and from other continental ports for Ontario grown Goose wheat for a long time, providing the quality is good. In order to keep up our reputation and to hold this good market for the Goose wheat, it is of the utmost importance that the variety be kept strictly pure. There is nothing that is likely to injure the export trade of the Goose wheat so much as the impurity of the sample. The grain should be kept free, not only from fall and spring wheat, but also from oats and barley. Some of the largest Ontario exporters claim that they get the best quality of Goose wheat in the counties of York and Peel, the wheat in this section being mostly pure, except for a slight mixture of barley and oats. Both in the west and in the midland divisions there is a considerable percentage of other varieties of spring wheat mixed with the Wild Goose. Farmers who wish to secure the best prices for the Wild Goose spring wheat should take great pains in securing pure grain for seed. Other varieties of macaroni wheats which we have grown are Medeah, Bart Tremenia, Sorentina, and Algiers. Each of these varieties have given better results than any of the finer varieties of spring wheat; but none of them equal the Wild Goose in yield of grain per acre. The Red Fyfe, Herison Bearded, Saxonka, Wellman Fife, and Red Fern are among the very best of the finer qualities of wheat, according to the average results of eight years' experiments.

Twenty-eight varieties of spring wheat were under experiment in 1900; and of these varieties, the Red Fern, Bart Tremenia, Pringle's Champion, and Wild Goose varieties gave the largest yields of grain per acre; and the Herison Bearded, Bart Tremenia, Wild Goose, Konigsburg, and Blue Democrat varieties produced grain which gave the heaviest weight per measured bushel.

Spelt (*Triticum Spelta*).

As numerous enquiries about a cereal known as Spelt have been received within the past few weeks, a fairly full report is here given in order that the greater number may become familiar with the results of the experiments made at the college with this grain. This report has recently been published in a few of our agricultural journals, and is here presented in order that those who did not read the report in the papers may know the results from this report.

Spelt is a cereal which is intermediate between wheat and barley; but it is usually classified as a variety of wheat. It is a native of the countries near the Mediterranean Sea. At the present day it is principally grown on the poorer soils in Switzerland, Southern Germany and Northern Spain. It is also grown at an elevation in Switzerland where the common wheat (*Triticum sativum*) will not thrive. For general cultivation, it is con-

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sidered much inferior to the finer varieties of wheat. When the grain is threshed the heads break in pieces at the different joints, leaving the grain in the chaff as closely clasped as ever. To secure the clean seed, special machinery is necessary to separate the chaff from the grain. From the nature of the region in which the Spelt is principally grown, we can understand that it is mostly cultivated by the poorer classes. The flour obtained from the grain is said to produce a coarse bread.

In order to find out the value of the Spelt for growing in Ontario, five varieties were imported in the year 1889. One of these was brought from Switzerland, one from Russia, and the other three were obtained in Germany. These five varieties were carefully tested in our experimental grounds and all of them gave poor results. The best variety gave a yield per acre of fifteen bushels of grain in the chaff, and this weighed about forty pounds per measured bushel. Two of the other varieties gave an average of only about six bushels per acre, and the remaining two varieties produced no grain whatever. The average yield of straw per acre from the five varieties was only three quarters of a ton. Some of the varieties were tested for two and three years and were then discarded on account of the poor results obtained from them.

Some of the seedsmen on this side of the Atlantic are now booming the Spelt very extensively. Extravagant claims are made for it, as will be seen from the following quotation taken from an American seed catalogue for 1900: "First, you thresh 50 to 80 bushels of grain, equal to corn, or barley, or oats, or rye, or peas, or wheat, as a food; and then comes from 4 to 6 tons of straw hay, equal to timothy. It's the perfection of food for cattle; hogs yell for the food, cows jump a six-foot fence to get at the straw hay, horses fight for it, sheep delight to fatten on it, poultry relish the grain,—I tell you, Salzer's Spelt is the greatest dry food on earth. . . It yields 80 to 100 bushels of richer food than corn, and gives besides four tons of good hay per acre. . . We recommend the same heartily. We never fool the farmer."

A quantity of seed of Salzer's Spelt was purchased in the spring of the present year, and two plots in the experimental grounds were sown with this variety. The results obtained this season were very similar to those obtained ten years ago. In yield of grain per acre, the best plot of the Spelt was surpassed by seventy five per cent. of the varieties of spring wheat. The grain as it came from the threshing machine weighed forty-four pounds per measured bushel, and after the chaff had been removed it weighed a little less than fifty-eight pounds, being lighter in weight per measured bushel than any of the twenty-eight varieties of the common spring wheat grown at the college this year.

Winter Wheat.

Upwards of three hundred plots were used for the winter wheat experiments conducted at the Ontario Agricultural College during the past year. The greater number of these tests have been carried on for several years in succession and the average results are of greater value than those obtained from tests of only one season. The following summary results of some of the experiments are presented in the hope that they may prove of service to the people of Ontario who are interested in the production of winter wheat.

Varieties.—One hundred and fifty-nine varieties of winter wheat have been grown at the College within the past thirteen years. These include the Canadian varieties and also those imported from Germany, Russia, France, England, Scotland, Australia and the United States. Ninety-four kinds have been tested for at least five years and only the best kinds have been retained. The thirty-three most worthy varieties in the five years' tests were all grown again this year. The five varieties which gave the highest, and the three varieties which gave the lowest average yields in the six years' tests of the thirty-three varieties are as follows:

	Strength of Straw	Lbs. per Bush.	Bushels per acre (60 lbs)
1. Dawson's Golden Chaff (white)..	Strong	60.3	56 7
2. Egyptian Amber	Weak	61.3	52 6
3. Imperial Amber...............	Weak	60.6	52 1
4. Early Genesee Giant (white)...	Strong	60.5	51 9
5. Reliable (red)..................	Weak	61.4	50.9

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	Strength of Straw.	Lbs. per Bush.	Bushels per acre (60 lbs)
31. Treadwell (white)	Strong	60.7	42 3
32. Turkey Red	Weak	61.9	41 3
33. Velvet Chaff (red)	Strong	62 5	40.7

The grain of each of these varieties was recently judged for milling qualities by representatives from the Jas. Goldie Milling Co., Guelph, with the following results: Dawson's Golden Chaff, good; Egyptian Amber, extra good; Imperial Amber, extra good; Early Genesee Giant, good; Reliable, medium; Treadwell, extra good; Turkey Red, good; and Velvet Chaff, poor. Some millers speak against and some in favor of the Dawson's Golden Chaff as a milling wheat. The grain of the Turkey Red variety is very hard and evidently is well liked by the millers of some of the Western States.

SELECTION OF SEED.—For each of four years, different selections of seed have been made from each of two varieties of winter wheat and have been sown on separate plots. The average results in yield of grain per acre of the eight tests thus made are as follows: Large plump seed, 42.1 bus.; small plump seed, 35.0 bus.; shrunken seed, 33.5 bus.; and broken seed, 7.3 bus. The grain produced from the large plump seed also gave a greater weight per measured bushel than that produced from any other selection.

DATES OF SEEDING.—The average of several years' results from seeding at different dates shows that the grain which was sown on or before the ninth of September gave a considerably larger yield of both straw and grain than that which was sown after that date. The very best yields were obtained from the wheat which was sown in the last week of August.

PREPARATION OF THE SOIL.—An experiment with different preparations of winter wheat land has been conducted in duplicate in each of four years. The average results in bushels of grain per acre of the eight tests are as follows: Twenty tons of farm-yard manure per acre on bare summer fallow, 40.9; crop of peas plowed under, 36.1; bare summer fallow, 33.8; crop of buckwheat plowed under, 29.6. These results show that peas give much better results than buckwheat when used as a green manure on land to be used for winter wheat.

WHEAT AFTER GRASS AND CLOVER.—In an experiment conducted during the past year in growing wheat on grass sod and on clover sod, it was found that the former gave 28.2 per cent. less in yield of grain per acre than the latter. Ten plots were used for this experiment. The crop of both grass and clover was removed from the land in 1899, after which the land was plowed and the wheat was sown during the first week of September. The experiment will likely be repeated for several years.

METHODS OF SOWING.—In each of six years, an experiment has been conducted in duplicate by sowing winter wheat broadcast and with a drill. The results from sowing the same quantities of seed by the two methods are very similar, the yields per acre being practically equal. It should be understood, however, that in every case, the land was in a good state of cultivation when the seeding took place.

DATES OF CUTTING.—In order to find out the influence of cutting wheat at different stages of maturity upon the quality of the grain for seed purposes, samples were taken from the crop cut at different dates, and these samples were carefully sown upon separate plots. In the average results of these tests made with two varieties in each of five years, it was found that the heaviest weight of grain per measured bushel, and the largest yield of grain and straw per acre, were produced from seed taken from the crop which had been allowed to become very ripe before it was cut.

SPRING RYE AND WINTER RYE.

About 140,000 acres are used for the rye crop in Ontario each year. This is about 30,000 acres less than the area used annually for the potato crop, and is about double the number of acres devoted to the growing of mangel wurzels.

SPRING RYE.—Four varieties of spring rye were grown in our experimental plots in

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1900. The yields, although not quite so large as in 1899, were very satisfactory. The yield per acre produced by each of the varieties was as follows: Dakota Mammoth rye, 38.7 bushels; Prolific spring rye, 37.7 bushels; Common rye, 37.5 bushels; and Colorado Giant rye, 34.5 bushels. It will be seen that there is a difference of 4.2 bushels per acre in favor of the Dakota Mammoth rye as against the Colorado Giant variety. In the experiment conducted in 1899, the Common rye was not included, and there was a greater difference in the results of the other three varieties for that year than in 1900. In 1899, the yields per acre produced by the three varieties were, 50.9 bushels for the Dakota Mammoth rye; 42.1 bushels for the Prolific Spring rye; and 24.5 bushels for the Colorado Giant variety. The Colorado Giant, which is also known as Polish Spring wheat, has come at the bottom of the list in yield of grain per acre in each of the years in which it has been grown.

WINTER RYE.—The yields per acre of the winter rye were very large this year. The Mammoth producing 71.4, and the Common variety 70 bushels per acre. Although 56 pounds per measured bushel is the Ontario standard for rye, the Mammoth variety produced grain which weighed 59.1 pounds and the Common, 58.9 pounds per measured bushel in the crop of the past year. The yield of straw per acre was practically four tons in each case. These results show that the crop of winter rye was excellent this season, and that there is but little difference between the two varieties under experiment.

BUCKWHEAT.

The yield of buckwheat this year was below the average of several years past. The Japanese variety produced only 15.7 bushels; the Silver Hull, 11.0 bushels; the Common Grey, 9.9 bushels per acre. In the average of three years' experiments previous to 1900, we find that the Japanese produces 22 bushels; the Silver Hull, 18 bushels, and the Common Grey, 15.7 bushels per acre. Thus it will be seen that the Japanese has given the best yield of grain per acre. As a rule, however, the Silver Hull produces a grain which weighs somewhat heavier per measured bushel than that produced by the Japanese variety.

FIELD PEAS.

Upwards of one hundred varieties of field peas have been grown in our experimental grounds within the past twelve years. The greater part of these have been tested for at least five years in succ ssion. Not only have these varieties been tested for their productiveness, but they have also been examined very carefully during each of the past few years in order to find out those varieties which were least injured by the pea weevil (*Bruchus pisi*), perhaps more commonly known as the pea bug. The adult beetle deposits its yellow eggs on the outside of the young pod of the pea plant early in the summer. These hatch in a few days and the larvæ bore through the pods into the peas wher they eat a considerable portion of the interior of the peas. They remain inside the grain until they are fully grown. They sometimes emerge from the peas in the autumn and sometimes not until spring. As the pea weevils are becoming very numerous throughout the southern part of Ontario, great injury is being done to the pea crop and some farmers are giving up growing the common varieties of peas on this account. The following table gives the average yields per acre of 26 of the leading varieties of peas grown in the experimental department for six years in succession, and it also gives the percentage of weevily peas of each variety in each of three years.

It will be observed that the White Wonder, New Zealand Field, Early Britain, Egyptian Mummy, New Zealand Brown, and Tall White Marrowfat varieties have given the largest average yield of grain per acre. When considering the yield of grain per acre, however, we should consider also the yield of straw per acre, as some of the varieties produce too much straw for rich land, while others do not produce enough straw for poor land. Of the six varieties here mentioned, it will be seen that the White Wonder produced only about 1¼ tons of straw per acre, while both the Egyptian Mummy and the Tall White Marrowfat produced practically 1⅞ tons of straw per acre. The greatest yield of straw of all the varieties here mentioned was produced by the Prussian Blue. It will be seen from the table here given that of twenty-six varieties of peas, the Egyptian Mummy, Canada Cluster, White Imperial, Golden Vine, Multipliers, Coffee, White

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Wonder, and Prussian Blue varieties have been the freest from the ravages of the pea weevil. The Improved Grey, Black Eyed Marrowfat, Early Britain, Tall White Marrowfat, Potter, and Chancellor are the varieties, which on the average, have been most injured by the weevil. The Grass peas, Egyptian peas, and Cow peas, which are all weevil-proof varieties, are discussed under separate headings.

Varieties.	Percentage of Peas containing Weevil.				Average Results for Six Years.		
					Weight p'r me's'd bus.	Yield per Acre.	
	1897	1898	1900	Average 3 years.		Straw.	Grain.
	per cent	per cent	per cent	per cent	lbs.	tons.	bus.
1. White Wonder	27	20	75	41	62 04	1.24	40.28
2. New Zealand Field	34	29	78	47	59.78	1.30	38 40
3. Early Britain	34	49	75	53	58.94	1.41	37.60
4. Egyptian Mummy	15	11	47	24	63.53	1.68	36 40
5. New Zealand Brown	34	44	70	49	58.13	1.52	36.39
6. Fall White Marrowfat	27	54	76	52	60 51	1.64	36 28
7. Potter	29	40	82	50	60.39	1.52	35.22
8. New Zealand Blue	31	36	74	47	61.15	1.21	34 88
9. Prussian Blue	30	40	52	41	60.74	1.79	33.16
10. White Eyed Marrowfat	26	43	65	45	61 43	1.59	32 84
11. Common Grey	18	29	79	42	57.75	1.56	32.63
12. D'Auvergne	20	36	80	45	60.48	1.31	32.53
13. Chancellor	18	54	77	50	60.28	1.27	32.23
14. New Canadian Beauty	31	36	74	47	61 20	1.42	31.90
15. White Imperial	15	34	67	39	60 38	1.47	31.87
16. Improved Grey	45	55	84	61	57.99	1.32	31.87
17. Crown	42	34	63	46	59.10	1.47	31.17
18. Canada Cluster	17	23	57	32	62.19	1.46	31.03
19. Black Eyed Marrowfat	37	50	77	55	60.52	1.40	30.11
20. Sword	17	49	71	46	60 75	1.52	29.71
21. Golden Vine	25	33	63	40	61.34	1.40	29.33
22. Centennial White	27	43	64	45	61.07	1.38	29.27
23. Multipliers	28	42	49	40	61.15	1 78	28.50
24. Prince Albert	30	45	55	43	61 16	1.66	27 38
25. Striped Wisconsin Blue	14	42	72	43	61.46	1 74	27.20
26. Coffee	17	32	72	40	59.13	1.58	25.68

For five years in succession, the peas grown in the experimental department have been treated for the pea weevil as soon as possible after harvest. We have used carbon bisulphide for this purpose in each of the five years, and as the results have proved very satisfactory, I give a concise summary of the treatment, which is simple in method and effectual in results. The peas are placed in a comparatively air-tight box, sometimes in bulk and sometimes in cloth bags. Flat dishes are placed on top of the grain and after the carbon bisulphide is poured into them, the box containing the peas is closed and allowed to remain undisturbed for about 48 hours, in order that the vapor, which is two and a half times heavier than air, may penetrate every portion of the box and do effective work. The weevil can be destroyed in this way at any stage of its growth; but the treatment should not be attempted when the thermometer stands lower than 10° below zero. It is wise, in fact, to apply the treatment when the weather is quite warm in order that the liquid may vaporize rapidly and continuously. I would strongly recommend treating the peas immediately after they are harvested and threshed in the autumn, to destroy the weevil when they are small and entirely enclosed in the pea. The vapors of the carbon bisulphide will penetrate the skins of the peas, and destroy the weevils before they have completed their work of destruction and made their escape. Peas which are not treated in the autumn should be treated in the warm days of the winter or in the spring. If all farmers in the southern part of Ontario should treat their peas in this way for two years, it would likely stop the ravages of the insect for a time at least.

Carbon bisulphide is a clear liquid which volatilizes very rapidly: and as the vapors are very inflammable, great care should be taken to keep fire away from them. Carbon bisulphide can be purchased in small quantities from most druggists, or in larger quantities from the manufacturers. It is considered that 1½ pounds of the liquid are sufficient for each ton of grain to be treated, if used to the best advantage. We generally, how-

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ever, use about one pound of the liquid to each twelve or fifteen bushels of grain, as it is important to have the work thoroughly done and avoid the necessity of repeating it.

Grass Peas.

One of the greatest advantages of growing the Grass Peas in Ontario at the present time is the fact that it is entirely free from the ravages of the pea weevil (*Bruchus pisi*), usually known as the pea bug, which is doing so much damage to the pea crop in the southern part of Ontario. The Grass Pea produces straw of good length and of good quality, and a grain which is angular in form and very hard. In seven years' experiments at the College, the Grass Pea has produced an average of 2.3 tons of straw per acre, a little over 23 bushels of grain per acre, and an average weight of grain per measured bushel of 64.5 pounds. In the spring of 1900, the Grass Peas and the Oddfellow Peas were two varieties sent out for co-operative experiments over Ontario. Ninety-nine reports of successfully conducted experiments were received. When these reports were summarized, it was found that the average yields per acre were 22.7 bushels for the Grass Peas, and 19.5 bushels for the Oddfellow variety. It will, therefore, be seen that the Grass Pea has made a very fair record as a grain producer. The results of the Grass Pea tests have been given in a number of our annual reports since 1889, and we are pleased to learn that this pea is now being grown quite extensively in some parts of Ontario where the pea weevil is doing so much damage to the common varieties of peas.

Egyptian Peas

The Egyptian Pea, also known as Coffee Pea, Chick Pea, Idaho Pea, etc., and known to botanists by the scientific name of *Cicar arietinum*, has been grown at the College for several years The plants have an upright, branching growth. The seed is somewhat larger than that of the common pea and is enclosed in a short, thick, hairy pod, and there is usually not more than one pea in each pod. Like the Grass Peas, this variety is entirely free from the ravages of the pea weevil (*Bruchus pisi*). The Egyptian Pea, as a grain producer, has been carefully tested at the College for five years; and the average results show a yield of 38.8 bush. of grain per acre, a little over one ton of straw per acre, and a weight of grain per measured bushel of 61.8 pounds,—from which it will be seen that this variety is a large yielder of grain. The straw, however, is usually of poor feeding quality, as the leaves drop from the plants as they ripen, and the stems become of a fibrous nature. As the plants have a short, upright growth, they are not apt to lodge, even when grown on very rich low lying land, which is really the kind of soil best adapted to the cultivation of the Egyptian Pea.

Cow Peas.

Nearly all of the varieties of Cow Peas require such a long season of growth that they are suited only to the warm climate of the South. A few of the earlier kinds have been grown in the Northern States, and have been tested at our experiment station at Guelph. At least one or two varieties have been sown in our experimental grounds during each of the past nine or ten years. It has been found, however, that nearly all varieties are too late for the climate of Ontario, unless for plowing under as a green crop in some cases. The varieties which we have mostly grown are the Warren's Extra Early, Black Eye, New Era, and Whip-poor-will. During the entire period in which we have had these peas under experiment, no grain was produced until 1899, when the plants became sufficiently matured to produce a crop of peas, which was, however, very light. The yield of the New Era was the largest, but even this variety produced only about two bushels per acre.

Nine varieties of Cow Peas were grown in the experimental grounds in the year just closing. Of this number, the Italian, which was grown for the first time, gave the largest yield of grain per acre, namely, 12.3 bushels. Two lots of the Warren's Extra Early variety were grown, one being from seed imported from the United States, and the other from seed which was grown in our experimental plots in 1899. The home grown seed produced nearly double as much grain per acre as the American seed.

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Our aim is to acclimatize some of the most promising varieties of Cow Peas, with the object of producing one that will give good results in Ontario.

Sowing Peas at Different Dates to Determine the Relative Amount of Injury Done by the Pea Weevil (*Bruchus Pisi*).

In both the years 1899 and 1900, an experiment was conducted by sowing peas on four dates in order to get as good information as is possible regarding the influence of sowing at different dates on the amount of injury caused by the pea weevil in eating the interior portion of the grain. In 1899, the first seeding took place on the 26th of April, and in 1900 on the 25th of April. Two weeks were allowed between each two seedings. The last date, therefore, in which the peas were sown in 1899 was June 7th, and in 1900 June 6th. In 1899 the percentage of weevilly peas from each seeding was as follows:—1st Seeding 62 per cent., 2nd Seeding 60 per cent., 3rd Seeding 51 per cent., and 4th Seeding 24 per cent.; and in 1900, 1st Seeding 70 per cent., 2nd Seeding 60 per cent., 3rd Seeding 46 per cent., and 4th Seeding 41 per cent. It will, therefore, be seen that as the season advanced when the peas were sown there was less damage done by the pea weevil. In connection with this experiment, however, it is important to observe also the comparative yield of grain per acre produced from the four dates of seeding. In 1899, the number of bushels per acre was 10.2 from the 1st Seeding, 4.8 from the 2nd Seeding, 5.2 from the 3rd Seeding, and 1.7 from the 4th Seeding; and in 1900, it was 20.2 from the 1st Seeding, 18.4 from the 2nd Seeding, 14.4 from the 3rd Seeding, and 12.0 from the 4th Seeding. The yields are all light, and especially those for 1899, but the experiment shows that the comparative decrease in the yield of grain was greater than the comparative decrease in the per cent. of injury done by the weevil.

Field Beans.

Upwards of forty varieties of field beans have been grown in the experimental grounds within the past four years. Of this number, thirty varieties were grown three years previous to 1900. In the average results for those three years, the varieties which gave the largest yields per acre were as follows:—White Wonder, 23.3 bushels; Burlingame Medium, 22 bushels; Schofield Pea, 21.9 bushels; Pearce's Improved Tree, 21 bushels; and Medium or Navy, 20.7 bushels. In weight per measured bushel for the same years, the average results show that the White Wonder weighed 65.8 pounds; Burlingame Medium, 65.4 pounds; Schofield Pea, 62.2 pounds; Pearce's Improved Tree, 66.2 lbs.; and Medium or Navy, 65.7 lbs. A few of the other varieties gave heavier weights per measured bushel than those here mentioned; as, for instance, the Snowflake, which gave an average of 67.3 lbs. per measured bushel.

The results produced by the different varieties in 1900 are somewhat different from those in the average of the three years previous. For instance, the largest yields per acre were produced by the Day's Improved Leafless, 27.4 bush.; Small White Field, 29 bush.; Medium or Navy, 25.7 bush.; while that of the White Wonder was 22 7 bush.; Schofield Pea, 21.9 bush.; and Burlingame Medium 20.7 bush. The highest weights per measured bushel for 1900 were given by the Small White Field, 66.1 lbs.; Prolific Dwarf Tree, 65.7 lbs.; and Mexican Tree, 65.1 lbs. The White Wonder and the Schofield Pea varieties of beans each produced grain which weighed 64.5 pounds per measured bushel. Taking all things into consideration the White Wonder and the Medium or Navy varieties have given good satisfaction in the experiments conducted at the College.

Soy, Soja, or Japanese Beans.

About eighteen years ago, Prof. Georgeson, then connected with the Agricultural College in the State of Kansas, imported from Japan fifteen varieties of the Soy Beans, with which he conducted practical experiments on the Experiment Station grounds, and found that five of the varieties gave good results. Seed of these five varieties was imported from Kansas some eight years ago for growing in our experimental plots; and the Yellow Soy Bean has given decidedly the best results among the five varieties which we obtained from Kansas. A few years ago, the Agricultural College of Massachusetts also

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imported a number of varieties of the Soy Beans from Japan, and three of these have been tested in our experimental grounds. For four years in succession we have tested the Yellow Soy variety which we obtained from Kansas, and the Medium Green, Extra Early Dwarf, and American Coffee Berry, which we obtained originally from Massachusetts. In the production of grain, the Yellow Soy variety has produced the greatest yield in each of the tests made at the College. This variety produced 19.2 bushels of grain per acre in the tests of 1900. Of the different varieties under experiment in recent years, the Extra Early Dwarf has been the earliest, the Yellow Soy the second earliest, the American Coffee Berry the third earliest, and the Medium Green the latest to reach maturity. In many of the localities in Ontario, the Medium Green variety of Soy Beans would be too slow in maturing to produce seed, except in very favorable seasons. We believe that the Yellow Soy variety will give good results in Ontario.

CROP OF HAIRY VETCHES, (*Vicia vellosa*).

VETCHES FOR SEED.

The Common Vetches and the Hairy Vetches were both sown in 1900 and allowed to ripen for seed. As the Hairy Vetches have been doing so well as a fodder crop, and as the seed is very expensive, it was desirable to glean information regarding the possibility of producing seed of the Hairy Vetch in Ontario. Although the growing crop of both varieties was good, the seed production of the past year was not satisfactory. The Hairy Vetches ripened very unevenly. There were ripe seed, green pods, and blossoms

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on the plants at the same time. It is encouraging to note, however, that the yield of seed produced by the Hairy Vetches was a little more than double the yield produced by the Common variety. We hope to continue this experiment, and thus be enabled to get definite information as to the possibility of growing seed of the Hairy Vetch in our Province.

Flax

Varieties.—In each of the past four years, three varieties of flax have been grown under similar conditions in the experimental grounds. As the germination was unsatisfactory in 1899, we have results for only three years. From three years experiments with the Russian, Manitoba, and Common varieties of flax, it is found that the Russian has given the largest yield of seed per acre, namely, 14.2 bushels. There is not much difference in the appearance of the three varieties, except in the size of seed, the largest being produced by the Russian variety and the smallest by the Common variety.

Quantity of Seed.—Each variety of flax was sown at the rate of ½ bushel and 1½ bushels of seed per acre in the spring of the present year. The thin seeding is usually considered best for the production of seed, and the thick seeding for the production of fibre. In the yield of seed per acre, however, in 1900 the thick seeding gave an average of 13.2 bushels per acre, while the thin seeding produced only 10.3 bushels per acre. This shows a difference of nearly three bushels per acre in favor of the thick seeding. It must be remembered, however, that there was one bushel more seed per acre used for the thick seeding than for the thin seeding. Thus the real difference in the two methods is only about two bushels per acre.

Millet Seed.

In each of the years 1894, 1898, 1899, and 1900, different varieties of millet were llowed to ripen, to ascertain the comparative results of the different varieties in yield of seed per acre. The California variety of millet gave the largest yield of seed per acre in 1894, the second largest in 1898, the third largest in 1899, and the second largest in 1900. Among the twenty varieties grown in the past year, the largest yields of seed per acre were as follows: German or Golden, 64.6 bush.; California, 52 6 bush.; Hungarian Grass, 50.2 bush.; and Early Harvest, 49.3 bush. The lowest yields were produced by the White French, 17.7 bush.; and the Common millet, 19 7 bush. per acre. Although the German or Golden gave decidedly the largest yield of seed per acre in 1900, still, taking one year with another, the California variety has given the best average results.

Flint Corn.

In past years, the results of the dent, flint, and sweet variety of corn have all been given together, and the results in total yield of grain per acre, yield of ears per acre, comparative earliness of the different varieties, etc., have been presented in the report under one heading. In 1900, however, after the ears were husked and weighed in the field, they were taken to the experimental building and allowed to dry, after which they were shelled and the yield of grain of each variety ascertained. Of the twenty-two varieties thus tested, it is found that the King Phillip, Angel of Midnight, Pride of Canada, Salzer's South Dakota, Salzer's North Dakota, Longfellow, and Genesee Valley produced the largest yield of grain per acre in the order here given, the King Phillip producing the largest yield. As each of these varieties produced seventy or more bushels of shelled grain per acre, it will be seen that the yields of corn were excellent. On weighing both the shelled grain and the cob from which the grain has been removed, it was found that the relative proportions of grain to cob in the different varieties varied considerably. For instance, the dried ears of the Angel of Midnight yielded 83.2 per cent of shelled grain; Longfellow, 82 per cent; King Phillip, 81 per cent; Salzer's North Dakota, 80.5 per cent; Compton's Early, 80 per cent; and Thoroughbred White Flint, 74.4 per cent. It will be seen, therefore, that the ears of the Angel of Midnight variety produced a comparatively high percentage of shelled grain, while those of the Thoroughbred White Flint produced a comparatively high percentage of cob. The relative size of the grain of each variety

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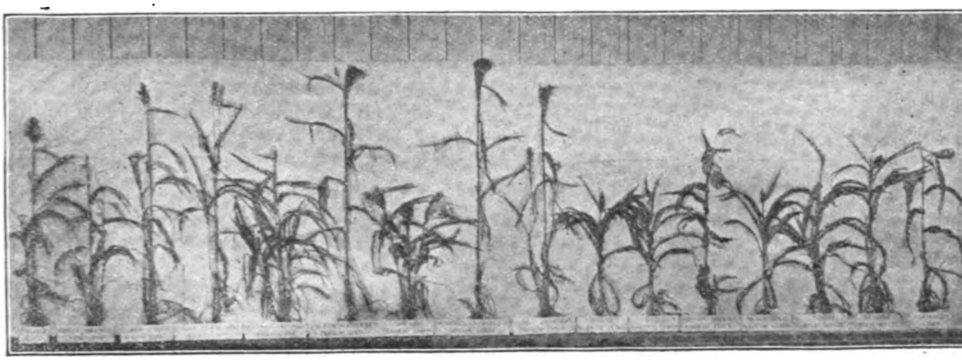
was also compared, and it was found that the Canada Yellow, Angel of Midnight, Salzer's North Dakota, and King Phillip produced the largest sized kernels, and that the Dakota Gold Dollar, Large White Flint, and Compton's Early produced the smallest-sized kernels.

It must be remembered that these results are only for one year; but as the experiment was conducted in duplicate, and the figures here given are the average of two tests in every case, the results should be valuable.

SORGHUM AS A GRAIN PRODUCER.

Sugar Cane.—The first experiment in which we have attempted to ascertain the amount of seed which could be obtained from different varieties of sugar cane, was conducted in our experimental department in 1900. Five varieties were sown side by side on the 9th of June. The seed was planted about 27 inches apart each way, there being six seeds planted in each place. Only three plants, however, were allowed to remain in each hill, after the growth had become nicely started. This method was adopted in order that a complete stand of plants might be secured. The land was kept on the level and was cultivated similarly to that producing a crop of corn. All varieties were allowed to remain as late as the season would permit before they were cut. As the seed of the sugar cane is produced at the top of the plants, the heads were removed and after being allowed to dry were threshed. The Fodder Cane produced the largest yield of seed per acre, 20.8 bush; and the Early Minnesota Sugar Cane came second, with a yield of 19.9 bushels per acre. It will thus be seen that some of the varieties of sugar cane will produce a good yield of seed per acre in Ontario, provided the season is favorable.



SIXTEEN VARIETIES OF SORGHUM.

(An average plant of each variety.)

The varieties in the illustration and in the list of results are arranged in the same order—the name of the variety on the left of the illustration and at the top of the list of results being identical.

Broom Corn.—The information regarding date of seeding, method of cultivation, etc. which is given under the item of sugar cane will apply equally to the broom corn. Four varieties in all were planted in the spring of 1900. These varieties gave the following yields of seed per acre, namely, Improved Evergreen, 27.1 bush.; Early Japanese, 17.8 bush.; California Golden, 15.5 bush; and Dwarf, 5.3 bush. It will be seen from these figures that there was a difference of seed per acre of nearly twenty-two bushels between the Improved Evergreen and the Dwarf varieties.

Other Sorghums.—Besides the different varieties of sugar cane and broom corn, a number of other varieties of sorghum were grown under uniform conditions with varying results in seed production. The following shows the yield of seed per acre produced by the different varieties: Brown Dhoura corn, 14.3 bush.; Jerusalem corn, 11.7 bush; White Kaffir corn, 1.3 bush; Black Rice corn, 9 lbs; and Yellow Millo Maize, 6 lbs. The Red Kaffir corn and the White Millo maize produced no grain whatever, as the favorable

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season of 1900 was not of sufficient lenghth to allow these varieties to ripen their seed. Only the very earliest varieties of sorghum are likely to ripen their seed at Guelph in the average season.

Varieties of Sunflowers.

In all, seven varieties of sunflowers have been grown in the Experimental Department within the last few years. The main object in growing these has been to ascertain the yields of the different varieties per acre, especially the comparative yields of heads, as the heads are sometimes used for cutting and mixing with corn in the silo, and the seed is also frequently used as a poultry food. Several of the varieties, however, have given poor results and all have been discarded, with the exception of three of the most satisfactory kinds, namely, the Black Giant, Mammoth Russian, and White Beauty.

These three varieties are good yielders, and are quite distinct from each other. The Black Giant and the Mammoth Russian have each been grown for six years, and the White Beauty for four years in succession. In the average of the six years' experiments the Black Giant has surpassed the Mammoth Russian by about 200 lbs. of *heads per acre*, the difference in 1900 being 240 lbs. in favor of Black Giant. The yield of the White Beauty variety has been somewhat less than that of the Mammoth Russian and also of the Black Giant.

The common variety of sunflower was included in the experiment for three years and gave on an average four-fifths of a ton of heads per acre less than the Mammoth Russian.

It will, therefore, be seen from what has already been said that the Black Giant has given the largest yield of heads per acre, and that the Mammoth Russian comes second from the top in this respect.

For three years in succession, the *yield of seed* from each of the three varieties of sunflowers has been obtained. The Mammoth Russian produced the largest yield of seed per acre in 1898 and the White Beauty the largest yield of seed per acre in each of the two years 1899 and 1900. Taking the three years into consideration we did not find a great difference between the yields produced by the Mammoth Russian and the White Beauty varieties, only an average of 10 lbs. per acre in favor of the White Beauty.

The Black Giant variety gave good yields of seed in 1898 and 1900, but rather poor results in 1899. We find that 1150.8 pounds of seed per acre represents the average yield of the three years' test of the three varieties. As the standard weight for sunflower seed is 20 pounds per bushel, it will be seen that the average yield of sunflower seed per acre has been 57½ bushels by weight. A person wishing to grow sunflowers will not make any great mistake by selecting any one of the three varieties here mentioned.

Grain Grown in Mixtures for the Production of Grain and Straw.

For six years in succession, a very interesting experiment was conducted by growing oats, spring wheat, barley, and peas, separately and in various combinations for the production of grain and straw. Six mixtures having two classes of grain in each mixture, four having three classes of grain in each mixture, and one having all four classes of grain in combination, were used each year. This made in all eleven mixtures besides the four grains grown separately, forming in all fifteen plots. This experiment was conducted in duplicate, thus making thirty plots each year, or one hundred and eighty plots in the six years. The results from this extensive experiment showed that a mixture of barley and oats gave an average of 2,260 lbs. of grain, and that a mixture of peas and wheat gave a yield of only 1,322 lbs., or a yield of 939 lbs. of grain less than that produced by the mixture of barley and oats. In yield of straw per acre in the average of the six years' experiments, the peas and oats produced the greatest, and the peas and wheat the lightest yield. It was thus found that of all the mixtures used, the combination of barley and oats was the most productive. It was also found that the mixtures produced a larger yield per acre than the same grains grown separately in about ninety per cent. of the experiments.

Having determined that a mixture of oats and barley was well adapted to a large production of grain, it became of importance to know the best proportions of these grains to use in the mixture to give the most satisfactory results. It was, therefore, decided in

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the spring of 1900 to conduct an experiment in sowing nine different proportions of oats and barley, in order to determine which mixture and which quantity of seed would give the best results in the production of grain and of straw. The following gives the amount of oats and barley per acre in each mixture:--(1) Oats ½ bu. and barley ½ bu.: (2) oats ½ bu. and barley 1 bu ; (3) oats ½ bu. and barley 1½ bu. ; (4) oats 1 bu. and barley ½ bu. ; (5) oats 1 bu. and barley 1 bu.; (6) oats 1 bu. and barley 1½ bu. ; (7) oats 1½ bu. and barley ½ bu. ; (8) oats 1½ bu. and barley 1 bu.; (9) oats 1½ bu. and barley 1½ bu.; This entire experiment was conducted in three places in our experimental grounds in 1900. In the average of these three experiments, it was found that the largest yield of grain per acre was produced from the mixture of *1 bus. oats and 1½ bus. of barley per acre*, the yield being 2,728.3 lbs. The smallest yield of grain per acre was produced from the mixture of 1½ bus. of oats and ½ bu. of barley per acre. In yield of straw per acre, however, the greatest yield was produced from the heaviest seeding, namely, from 1½ bus. of oats and 1½ bus. of barley per acre. Taking into consideration the yield of both grain and straw, the mixture which gave the best general satisfaction was 1bu. of oats and 1½ bus. of barley per acre. This experiment will likely be repeated in future years.

In growing a mixture of oats and barley for the production of grain, it is important to select those varieties which require about the same length of time to reach maturity.

If a standard variety of oats, such as Banner or Siberian, is used, it is important to select some late variety of barley, such as the Chevalier Two-rowed, in order that the two varieties may mature at the same time. If a standard variety of barley, such as the Mandscheuri or Common Six-Rowed is used, it is then necessary to select some very early variety of oats, such as the Daubeney or Alaska. In the past year, an experiment was conducted with three different mixtures which would reach maturity at different times. The following gives the varieties in each of three mixtures and the number of pounds of grain produced from each mixture:-(1) Mandscheuri barley and Daubeney oats, 2,677.2 lbs. per acre; (2) Siberian oats and Chevalier Barley, 2,656.4 lbs.; and (3) Poland White oats and Kinna Kulla barley, 2,519 lbs. From these figures, it will be seen that the Mandscheuri barley and Daubeney oats gave the largest yield of grain per acre, this mixture giving 158.2 lbs. of grain per acre more than the mixture of Poland White oats and Kinna Kulla barley. In production of straw per acre, the different mixtures gave the following yields:—No. 1 gave 1.8 tons; No. 2 gave 2.7 tons; and No. 3 gave 2.4 tons. Although No. 2 mixture gave about 20 lbs. of grain per acre less than that produced by No. 1, still it will be seen that the yield of straw per acre in the case of No. 2 mixture was nearly one ton per acre greater than that produced from mixture No. 1.

Oats, Barley, Spring Wheat, and Peas Sown on Six Different Dates.

An experiment has now been conducted for six years in succession by sowing oats, barley, spring wheat, and peas on six separate dates in the spring of the year, starting with the first seeding at the time when the land is warm and dry enough to work to good

Seedings.	Average of Six Years' Results.							
	Weight per measured bush.				Yield of Grain per acre.			
	Oats.	Barley.	Spring Wheat.	Peas.	Oats.	Barley.	Spring Wheat.	Peas.
	lbs.	lbs.	lbs.	lbs.	bus.	bus.	bus.	bus.
1st Seeding	34.0	51.9	60.4	57.4	76.8	47.6	22.1	26.6
2nd Seeding	34.6	52.1	59.7	57.3	79 3	48.1	19.3	30.1
3rd Seeding	32.4	51.2	59.0	58.1	65.8	40.1	15.2	28.8
4th Seeding	30 0	49.3	58.7	57 9	54.0	35.3	12.5	25.5
5th Seeding	26.8	46.9	55.3	57.0	42.5	26.4	7.7	21.5
6th Seeding	23.0	44.3	53.3	57.0	32.8	17.5	6.0	19.5

advantage. As this test has been conducted in duplicate each year, it will be seen that no less than two hundred and eighty-eight plots have been used for this experiment within the past six years. The average dates of seeding are as follows:—1st seeding,

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April 18th; 2nd seeding, April 23-25: 3rd seeding, May 1-2; 4th seeding, May 9-11; 5th seeding, May 16-18, and 6th seeding, May 23-26. The aim was to have the seedings one week apart; but, owing to the unsuitable weather, we were compelled to make a few exceptions to this rule.

Although the average date of the first seeding was the 18th of April, the date is not specially mentioned in the table here given. It is very important for the reader to understand that the first seeding took place as soon as the land could be worked to good advantage. While the first seeding can usually be done at Guelph about the 18th April, it can undoubtedly be accomplished in the southern part of Ontario at an earlier date; and in the northern part of Ontario the date of the first seeding would be still later than at Guelph. In order for these results to be applicable to different parts of the Province, the exact dates of the different seedings should not be taken into consideration so much as the fact that the first seeding took place as soon as the land could be nicely worked, and that one week was allowed between each two seedings. When the results are examined from this standpoint they should prove of service to many places in Ontario. It will be observed from the results here presented that after the second seeding the decrease in both weight of grain per measured bushel and in yield of grain per acre is very marked in the case of each kind of grain, except in the weight of peas per measured bushel. These results should be very carefully studied by Ontario grain growers.

Selection of Seed Grain, and Results Therefrom.

A large amount of very careful work has been done within the past eight years in order to determine the influence of different selections of seed upon the resulting crop. The reader's attention is directed to the results of these experiments, which are becoming more valuable from year to year, owing to the increasing length of time during which the experiments have been conducted. Fresh seed has been taken each year from the general grain crop, secured from the Farm or the experimental department. It will, therefore, be understood that whatever difference there is from the influence in the selection of seed, that difference is due purely to the work of the one year. For the large plump seed, none but well-developed seeds were selected; for the small plump sample, the grain selected was of a uniform character; and for the shrunken sample, none but shrunken grains were used—the last selection being made regardless of the size of the kernels. An equal number of grains of each selection was used, the object being to ascertain the comparative producing powers of the seeds of the different selections.

Barley.—The experiments with the different selections of seed barley extend over a period of six years, the average results for the whole period being as follows: Large plump seed, 53.8 bus. of grain per acre, 1.5 tons of straw per acre, and 49 5 lbs. of grain per measured bushel; small plump seed, 50 4 bush. of grain per acre, 1.5 tons of straw per acre, and 48.8 lbs. of grain per measured bushel; and shrunken seed, 46 bus. of grain per acre, 1.4 tons of straw per acre, and 49.1 lbs. of grain per measured bushel. From these results it will be seen that the large plump seed has given an average of nearly 8 bush. per acre more than the shrunken seed, and a little over 3 bush. per acre more than the small plump seed. In the results for 1900 the large plump seed gave 8.5 bus. per acre more than the small plump seed.

Spring Wheat.—The experiment in seed selection with spring wheat has now been conducted for a period of eight years. The average results for the eight years show that large plump seed produced 21 7 bus. of grain per acre, 1.4 tons of straw per acre, and grain which weighed 59.1 lbs. per measured bushel; that the small plump seed produced 18 bush. of grain per acre, 1.3 tons of straw per acre, and grain which weighed 58.3 lbs. per measured bushel; and that shrunken seed produced 16.7 bush. of grain per acre, 1.2 tons of straw per acre, and grain which weighed 56.9 lbs. per measured bushel. The plump seed produced grain which was heavier than that produced from shrunken seed by a little over 2 lbs. per measured bushel. The greatest difference in the average yield of grain per acre was between that produced from the large plump seed and that produced from the shrunken seed, the difference being 5 bus. per acre in favor of the former. The large plump seed, therefore, gave practically 30 per cent. more grain per acre than that which was produced by the shrunken seed.

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OATS.—Siberian oats is the variety which has been used in the experiment of seed selection for seven years in succession. The results of the experiment with oats are even more striking than either of the experiments with barley or spring wheat. In the average returns received for seven years, it is found that large plump seed produced 62 bus. of grain per acre, 1.9 tons of straw per acre, and grain which weighed 33.2 lbs. per measured bushel; that medium-sized seed produced 54.1 bush. of grain per acre, 1.8 tons of straw per acre, and grain which weighed 32.2 lbs. per measured bushel; and that small seed produced 46.6 bush. of grain per acre, 1 8 tons of straw per acre, and grain which weighed 31.8 lbs. per measured bushel. The large oats, therefore, produced 15.4 bush. per acre more than that produced by the small seed. This shows an increased production of grain of fully 33 per cent., resulting from the large as compared with the small seed oats.

PEAS.—For five years in succession an experiment has been conducted in the selection of peas. The summary results for the whole period show that large peas gave an average of 30.3 bus. of grain per acre, 1.3 tons of straw per acre, and grain which weighed 57.8 lbs. per measured bushel; and the small seed produced 23.9 bus. of grain per acre, 1.1 tons of straw per acre, and grain which weighed 57.6 lbs. per measured bushel. It will be seen that there is but little difference in the weight of grain per measured bushel, whether grown from large or from small seed. The difference in yield of grain per acre, however, is quite marked, as the large seed produced 6.4 bus. per acre more than the small seed, or an increase of about 27 per cent.

OTHER SELECTIONS.—Several other experiments in seed selection are in progress, and the results will be reported on some future occasion.

SOWING SPRING GRAIN BROADCAST AND WITH A GRAIN DRILL.

For five years in succession, oats, barley, spring wheat and peas have been sown both broadcast and with a grain drill on each of six different dates. We have, therefore, made one hundred and twenty separate tests in comparing these two methods of sowing. The soil for this experiment was always well cultivated, and received exactly the same treatment for each method of sowing. The same amount of seed was used for sowing broadcast as for sowing with a grain drill. The average yields of grain produced from the two methods of sowing are as follows: Oats—drilled, 53.4 bus.; broadcast, 50.8 bus. Barley—drilled, 36 bus.; broadcast, 34.7 bus. Spring wheat—drilled, 13.2 bus.; broadcast, 13 4 bus. Peas—drilled, 23.1 bus.; broadcast, 21.8 bus. As these averages include the results from sowing at six different dates in the spring, the yields are not so high as if the results of the latest seedings had not been included. By comparing the two methods of sowing the four grains on six different dates and in five separate years, we find that the grain which was sown with the grain drill gave 1.28 bus. per acre more than the grain which was sown broadcast with the hand.

COMPARATIVE VALUE OF CULTIVATING AND PLOWING ROOT, POTATO AND CORN GROUND.

An experiment is in progress in which sections of land that had produced potatoes, fall turnips, Swede turnips, rape and corn have been partly cultivated and partly plowed the following spring, and afterwards sown with oats, barley, spring wheat and peas. The plowing and the cultivating for each separate test has been done simultaneously. Those portions of land which were cultivated were stirred to a depth of from 2½ to 3 inches, and those portions which were plowed were turned over to a depth of about 5 inches. The work was thoroughly done for both methods. The experiment has been conducted on land following potatoes and fall turnips in three different years, and on land following carrots, Swede turnips, rape, and corn for one year only. The results show that in the case of peas the yield of grain per acre was larger from the plowed land than from the cultivated land which followed each of the six crops here mentioned. In yield of wheat, oats and barley per acre, however, the results are quite similar for the two methods, the cultivated land giving slightly the best results with wheat, and the plowed land with oats and barley.

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Fertilizers with Grain.

Several experiments with commercial fertilizers on grain crops are in progress. In the year 1900 tests were made with fertilizers on oats, winter wheat, and corn. The result of these fertilizer experiments will be given in a future report.

Annual Crops for Pasture.

Through various causes the timothy and clover pastures, in many sections of Ontario, frequently fail to produce even a moderate amount of pasture for live stock. The germination of the seed is sometimes poor, the young plants are occasionally killed by the hot, dry weather of the summer, or by the sudden changes of the weather in the winter and in the early spring, and thus the foundation for a good pasture is destroyed in the early stages of its existence. When failures of this kind occur the farmer is often at a loss to know what to do to supplement his pasture in the best possible way. A considerable amount of work has already been done in testing different crops for cutting in the green condition for feeding to animals when required in the summer season. Some work has also been done in feeding corn silage in the summer season when the pastures supply an insufficient amount of food material. But little has been done, however, in testing our annual crops for the purpose of pasturing. In order to find out which annual crops are likely to give the best results when pastured, an interesting experiment was conducted this year in our experimental grounds. For this purpose we tested twenty-one different crops, the most being distinct varieties, and the remainder being different varieties mixed together. The crops were sown in three separate sets, there being twenty-one plots in each set, thus making in all a total of sixty-three plots. All of the plots were sown on the same day and under similar conditions. The crops included in this experiment were as follows: (1) oats, (2) oats and peas, (3) oats and common vetches, (4) oats and hairy vetches, (5) barley, (6) spring wheat, (7) buckwheat, (8) spring rye, (9) millet, (10) corn, (11) sugar cane, (12) Kafir corn, (13) common red clover, (14) crimson clover, (15) common vetches, (16) hairy vetches, (17) field peas, (18) grass peas, (19) cow peas, (20) yellow Soy beans, and (21) rape.

The main object of the experiment was to find out the relative value of the different crops in producing the greatest amount of the most valuable material for pasture both early in the season and throughout the summer. The seed in every instance was sown on the 5th of May. The three sets were handled as follows:

Set 1. The crops on all the plots in Set 1 were cut at the end of six, nine, twelve, fifteen and eighteen weeks after the seed was sown, thus making five cuttings for each crop. Each cutting was weighed in the green state, also after it was dried in the form of hay.

Set 2. Each crop was cut when it was considered to contain the greatest bulk of the best quality for feeding as green fodder. In order to ascertain the aftergrowth, another cutting was made on each plot later in the season.

Set 3. A hurdle fence was placed around the set of twenty-one plots and nine head of cattle were turned on the plots daily until the pasture was exhausted. The pasturing took place between June 26th and July 4th, animals being turned on the plots on seven different days. Careful notes were taken of the amount of crop eaten from each plot on each day. After the plots were pastured the first time they were allowed to remain undisturbed until the autumn, when the cattle were again turned in and the second growth was eaten off.

The following table gives the yield of green crop per acre produced by each variety on each of the five dates of cutting, as determined in Set 1. It also gives the total amount of green material produced on the five cuttings of each crop.

The table is full of interest and is very suggestive. It will be seen that the largest yields of green material per acre were produced by the spring rye and the buckwheat in the first cutting; the hairy vetches and the corn in the second cutting; the hairy vetches alone and the hairy vetches with oats in the third cutting; the sugar cane, millet and hairy vetches in the fourth cutting; and hairy vetches and sugar cane in the fifth cutting. Taking the total amount produced from the five cuttings it will be observed that the hairy vetches and the grass peas produced the largest amount, and the spring

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wheat the smallest amount of green crop per acre, the hairy vetches having produced nearly five times as great a yield as the spring wheat. The barley, spring wheat, buckwheat, spring rye, and field peas all gave fairly good crops at the first cutting, but none of them made any growth whatever after the third crop was taken from the land. An important feature in connection with this experiment is the fact that the hairy vetches, the millet, and the sugar cane gave such uniformly good results throughout the entire season, and would therefore, be likely to stand grazing better than most of the other crops in the experiment.

Crops.	Tons of green crop per acre at each cutting.					Total number of tons per acre in five cuttings.
	1st cutting, 6 weeks after seeding.	2nd cutting, 9 weeks after seeding.	3rd cutting, 12 weeks after seeding.	4th cutting, 15 weeks after seeding.	5th cutting, 18 weeks after seeding.	
Hairy vetches	2 0	4.2	2.4	1.0	.4	10.0
Grass peas	2 6	2.5	1.4	.6	.1	7.2
Corn	.9	3.6	.8	.5	.0	5.8
Buckwheat	4.2	.0	1.6	.0	.0	5.8
Sugar cane	.1	2.4	4.4	1 2	.5	5.6
Oats	2.7	1.7	.9	.2	.0	5.5
Spring rye	4.5	.7	.3	.0	.0	5.5
Millet	.8	2.4	.9	1.2	.2	5 5
Common vetches	1.8	2.6	1.1	.4	.1	5.5
Field peas	2.7	1.8	.8	.0	.0	5.3
Rape	.1	2.5	1.1	.9	.1	4.7
Common red clover	.0	1.8	1.2	.9	.1	4.0
Crimson clover	.0	2.4	.7	.7	.1	3.9
Kaffir corn	.0	2.2	.7	.6	.1	3.6
Barley	2.0	1.1	.4	.0	.0	3.5
Cow peas	.1	1.9	.8	.6	.1	3.5
Yellow Soy beans	.6	1.2	.9	.5	.1	3.3
Spring wheat	1.2	.6	.4	.0	.0	2.2
Oats and hairy vetches	2.8	2.6	2.4	.9	.5	9.2
Oats and common vetches	3.4	2.3	1 3	.2	.2	7.4
Oats and peas	3 1	2.1	1.0	.2	.0	6.4

In the second set, in which the crops were allowed to grow until it was considered they would produce the largest amount of green fodder of good quality, it was found that the largest yields were produced by: first, hairy vetches, 10.5 tons per acre; second, oats and peas, 9.5 tons per acre; third, field peas, 8.9 tons per acre; fourth, grass peas, 8.8 tons per acre; and fifth, oats and hairy vetches, oats and common vetches, and oats alone, each 8 tons per acre. In no case did the second crop in No. 2 set reach one ton of green material per acre. This shows that to get a continuous pasture crop it is best to start pasturing before the crops become too far advanced.

In the third set, where the different crops were pastured, it was found that the rape, spring wheat, corn, oats, barley, millet, Kaffir corn and sugar cane were eaten the most readily by the animals. All the crops, however, appeared to be relished by the animals, with the exception of the buckwheat and the spring rye, but as the latter crop grows so rapidly the plants were too far advanced before the animals had an opportunity to pasture upon them.

Although the foregoing are not by any means conclusive, they are quite suggestive, and should furnish some valuable information upon a subject regarding which there are many enquiries at the present time. Further tests will be made to obtain fuller information regarding the best pasture obtainable from our annual crops. It will be interesting to test such mixtures as the following: 1. Spring rye, millet and hairy vetches; 2. Spring wheat, grass peas and common red clover; 3. Oats, Kaffir corn, and hairy vetches, etc.

POTATOES.

A large number of experiments with potatoes have been conducted in our experimental grounds for five years in succession, and the results have been given in the annual reports from time to time. Other experiments have been conducted for a shorter length

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of time, and the results of these tests, which were made during the past season, are briefly stated in the following paragraphs :—

Varieties.—Ninety four varieties of potatoes were grown in the experimental grounds in the past year. Simply taking the results for the one year, we learn that each of the following varieties gave a yield of upwards of 220 bushels per acre: The Daisy, Rose's New Invincible, Paris Rose, Irish Cups, Bovee, Six Weeks, White Elephant, and Ohio Junior. Taking the average results of all the varieties grown for several years in succession in yield and quality of potatoes, we have found that the Empire State, Pearl of Savoy, American Wonder, Dempsey's Seedling, and Rural New Yorker No. 2 are among the very best varieties for general cropping. The Stray Beauty is the earliest potato which we have grown. It produces the largest yield per acre in a short time of growth of any variety, and is of fair quality for very early use; but as a medium late potato, it is surpassed in quality by a great many other varieties.

Influence of Coating Cut Potatoes with Lime and Plaster.—For several years in succession an experiment has been conducted by cutting potatoes and planting them with and without being sprinkled with plaster and with lime. Those potato sets which have been sprinkled with plaster have given decidedly the best satisfaction, as the results show that the plaster had a marked influence in increasing the yield of potatoes in the experiments conducted at the College. A similar experiment was conducted in a co-operative way over Ontario in the past year. In the average results of thirty-nine successfully conducted experiments over Ontario, it is found that the potatoes which had been cut and sprinkled with land plaster before they were planted gave 181.6 bushels per acre, while those which were cut and planted without being sprinkled with land plaster gave only 165.2 bushels per acre. This shows a difference of 16.4 bushels per acre in favour of sprinkling the cut potatoes with gypsum or land plaster.

Planting Potatoes on Same Day and Five Days After Being Cut.—Both at the College and throughout Ontario, experiments have been conducted in cutting potatoes five days previous to planting, and in cutting and planting potatoes on the same day. The results at both the College and throughout Ontario show that those which were cut and planted on the same day that they were cut gave about 18 to 19 bushels more per acre than those which were cut four, five, or six days before they were planted.

Planting Potatoes at Different Distances Apart.—An experiment was conducted in the past year in planting potatoes in rows 26½ inches apart with the potato sets one foot apart in the row, and also in planting potato sets 33 inches apart both ways. Exactly the same amount of seed was used in each method The experiment was conducted in duplicate, and the results show that the closer planting gave a yield of 31.4 bushels per acre more than that produced from the planting 33 inches apart each way.

Planting One, Two, and Four Potato Sets in Each Hill.—An experiment was conducted in 1899 and again in 1900 in planting one set in each place, two sets in each place, and four sets in each place, there being exactly the same amount of seed used in each instance. The experiment was conducted in duplicate each year. The results for 1900 show that the yield from planting one piece in a place was 5½ bushels per acre greater than from planting two pieces in a place, and that the yield from planting two pieces in a place was 19.2 bushels per acre greater than from planting four pieces in each hill. The results of the experiment conducted in 1899 were very similar to those of the experiments conducted in 1900.

Field Roots.

A number of experiments were conducted in 1900 with varieties, methods of cultivation, etc., of field roots. As the experiments are continued from year to year, the results become of greater value, and we hope to publish the accumulated results of several experiments with roots at some future time.

Sorghum.

Although the different kinds of sorghum differ considerably in their growth, they are classified by some of the best authorities under the scientific name of Andropogon sorghum. All the various kinds of sorghum originated in the East and probably came from a common stock, but through ages of cultivation they show considerable variation

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in growth and appearance. All the varieties of sorghum furnish fodder of more or less value for farm stock. Some of the varieties produce also a good yield of grain, as was pointed out in the earlier part of this report. The grain furnishes nutritious food, and in some countries is used for man as well as for the domestic animals. The upper parts of the plants of some of the varieties are used for the manufacture of brooms and brushes. The saccharine varieties furnish a juice from which is produced a large quantity of the syrup and sugar of commerce. It is said that all the sorghums will grow in drier climates, or under more trying conditions of drouth than Indian corn. The cultivation of sorghum is much the same as that of corn, but a larger amount of seed of the former is usually used. The following list gives the yield of green crop per acre and the percentage of the whole crop, which is in the form of leaf, as determined in the experiments of the past year :

Varieties.	Percentage of leaf to stem.	Tons of green crop per acre.
Fodder Sugar Cane	24 6	9.4
Early Orange Sugar Cane................	40 0	11 6
Early Amber Sugar Cane................	19 1	11.3
Early Minnesota Sugar Cane	17 8	13 2
Kansas Orange Sugar Cane	38.5	11 3
California Golden Broom Corn............	30.1	7 9
Dwarf Broom Corn	48 6	5 0
Improved Evergreen Broom Corn	27 4	6 4
Early Japanese Broom Corn	20 7	4 6
White Kaffir Corn.....................	41.6	10 2
Red Kaffir Corn.......................	46 3	9 1
Brown Dhoura Kaffir Corn	36 2	7.1
Black Rice Corn.......................	43 7	10 0
White Milo Maize......................	48.2	8 4
Yellow Milo Maize.....................	38 2	7.9
Jerusalem Corn	36.2	5.4

From the results here presented, it will be seen that there is a great variation in yield of grain per acre produced by the different varieties of sorghum, the highest yield being over 13 tons per acre and the lowest less than 5 tons per acre. It will also be seen that there is a great difference in the relative amount of stalk and leaf. In the case of the Dwarf Broom Corn and the White Milo Maize there was almost exactly one-half as much leaf as there was of stem, while in the case of the Early Minnesota Sugar Cane and Early Amber Sugar Cane there was less than one-fifth as much leaf as stem in the green crop. The greatest yields of heads were produced by the California Golden Broom Corn, Improved Evergreen Corn, and Jerusalem Corn. The varieties which propuced crops of the greatest height in 1900 were as follows : Improved Evergreen Corn 89 inches, California Golden Broom Corn, 88 inches, Early Minnesota Sugar Cane 85 inches, Early Amber Sugar Cane 82½ inches, and Early Japanese Broom Corn 80 inches ; and the varieties which produced the shortest crop were, Dwarf Broom Corn 48 inches, White Kaffir Corn 49 inches, Red Kaffir Corn 49½ inches, and Black Rice Corn 50 inches. The yield of grain per acre of the sorghums is given under another heading. The value of sorghums as a pasture crop is also referred to under the heading of "Annual Crops for Pasture."

Fodder Corn.

The experiments conducted with fodder corn in 1900 were with varieties, depth of planting, method of planting, and the application of fertilizers. As the weather was exceptionally good in the autumn of the year, even the late varieties had a much better chance to reach maturity than in the average season.

Varieties.—One hundred and thirty-eight varieties of corn were grown in the experimental department in 1900. These included flint, dent and sweet varieties. Of the varieties which have been grown for several years in succession, we find that the Mammoth Cuban and the Mastadon Dent are varieties which have given excellent satisfaction and which would likely do well on the warm soils of southern Ontario, where large vari-

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eties of corn can be grown safely; that the Wisconsin Earliest White Dent is a variety which gives a fairly good yield of total crop per acre which is of excellent quality, this variety producing the largest yield of ears per acre among sixty-seven varieties grown for five years in succession and being suited to the central part of Ontario where the frosts are not too severe; and that the three flint varieties, Salzer's North Dakota, Compton's Early and King Phillip, and the one dent variety North Star Yellow Dent, have given good satisfaction and are well suited for the central and northern part of Ontario.

Depth of Planting.—The corn was planted one half inch, one inch, one and a half inches, two inches, three inches and four inches deep in the latter part of May. This experiment was conducted in duplicate. The corn which was planted two inches deep gave the largest yield per acre in one set and the second largest yield per acre in the other set. On averaging the results of the two experiments, it is found that the corn which was planted to a depth of two inches gave the greatest total yield of crop per acre.

Planting Corn in Rows and in Squares.—In 1899 and again in 1900, an experiment was conducted in which corn was planted in rows in the one case and in squares in the other case. The rows were thirty-six inches apart one way, and the squares or hills were thirty-six inches apart both ways. In the rows, one kernel was planted every nine inches, and in the hills four kernels were planted every thirty-six inches. The land was cultivated on the level throughout the season. The Salzer's North Dakota variety was used for the experiment in each of the two years. In 1899, the squares produced 9.1 tons and the rows 8.5 tons green crop per acre. In 1900, the squares produced 9.1 tons and the rows 8.2 tons of green corn per acre. Taking the average results for two years it is found that the squares produced three-quarters of a ton of green crop per acre more than that produced by the rows. The corn in the squares grew about five inches taller than that which was sown in rows. The results of this experiment have been quite uniform in each of the two years, and point in favor of planting in squares or hills as against planting in rows or drills.

Some Fodder Crops.

For five years in succession, six varieties of fodder crops have been carefully tested in the experimental grounds. This experiment is an interesting one as several of the crops, regarding which so much has been said of late, are included in the test. Each year the crops were harvested when about the right condition for feeding purposes, and were weighed immediatedly on being cut; therefore, the results here given represent the yields of green crop per acre:

Varieties.	Average Length of crop in inches	Average No. of tons Green crop per acre.
Egyptian Peas	18.8	8.6
Yellow Soy Beans	24.2	8.0
Grass Peas	37.8	7.5
Crimson Clover	11.9	6.5
Prussian Blue Peas	47.5	5.8
Horse Beans	27.9	4.8

The Egyptian Peas, Soy Beans, and Grass Peas, which have given the largest yields of green crop per acre, are each described somewhat fully in the discussion of grain crops in the earlier part of this report.

Vetches.

For four years in succession, the Common vetches and the Hairy vetches have been grown in our experimental grounds for the production of green fodder. The Common spring vetch is fairly well known by many of our farmers, but the Hairy vetch is not as yet so well known throughout the Province. If seed of the Hairy vetch could be obtained at a moderate price, there would likely be a bright future for this crop in Ontario. When sown in the spring, the growth is at first very slow; but during the latter part of summer it usually grows abundantly, and produces a large yield of green crop per acre. The crop can be used in many ways. We have already reported the results of an experiment conducted in 1900 in which the Hairy vetch was tested as a pasture crop. This variety is claimed to give good results for soiling, ensilage, and for plowing under as a green manure.

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From the nature of the growth of the plants, we believe it would be one of the best cover crops which fruit growers could use in their orchards, as the plant is a nitrogen gatherer, and the crop completely covers and shades the ground. Some claim that the Hairy vetch is valuable as a hay crop. but, owing to the difficulty of curing the crop on account of its peculiar manner of growth, it is unlikely that it will become desirable as a hay producer.

In the average of four years' results, the Hairy vetch has produced a yield of 8.8 tons of green crop per acre, while the Common vetch, under similar treatment, has produced a yield of only 4.1 tons of green crop per acre. From these figures, it will be seen that the Hairy vetch has produced more than double the yield per acre as compared with that produced by the common variety. The illustration on page 109 shows one season's growth of the Hairy vetch as grown in the experimental plots.

We have distributed the Hairy vetch over Ontario for co-operative experimental work for two years in succession and the results, as reported by the experimenters, are certainly very encouraging

Grasses and Clovers.

The Province of Ontario possesses about thirteen million acres of cleared land. Of this area about five million acres are used annually for the production of hay and pasture. It will be seen, therefore, that about two-fifths of the cleared land of Ontario is devoted to the growing of grasses and clovers It is important, therefore that we give the subject of grasses and clovers a considerable amount of attention in our experimental work.

Varieties of Grasses.

Experiments have been conducted at the college with different varieties of grasses during each of the past twenty years. One of the principal objects in the earlier years of the work was to ascertain the most hardy varieties for our climate. Our past experience goes to show that the Meadow Fescue, Meadow Foxtail, Tall Oat, Timothy, Tall Fescue, Hard Fescue, Red Fescue, Wood Meadow, Rough Stalk Meadow, Sheep's Fescue, Various Leaved Fescue, and Fine-leaved Fescue have all proven to be quite hardy varieties. The Orchard Grass usually does well, but occasionally it is injured by the cold weather, and especially by the late frosts in the spring.

Experiments have been conducted within the last few years with the object of gleaning definite information regarding the comparative yields of hay per acre, produced by the different varieties of grasses. We are now enabled to give the average annual yield of hay per acre produced by each of eighteen varieties of grasses obtained from experiments covering a period of six years. The following table gives both the common names and the scientific names of the varieties, and also the average yield of each variety in the years 1895, 1896, 1897, 1898, 1899, and 1900.

Common Name.	Scientific Name.	Average No. of tons of hay per acre.
Western Rye	*Agropyrum tenerum*	4.00
Lyme Grass	*Elymus Virginicus*	3.65
Fringed Brome	*Bromus ciliatus*	3.29
Bearded Wheat	*Agropyrum Caninum*	2.87
Timothy	*Phleum pratense*	2.83
Canadian Lyme	*Elymus Canidensis*	2.75
Tall Oat	*Arrhenatherum avenaceum*	2.45
Orchard	*Dactylis glomerata*	2.18
Awnless Brome	*Bromus inermis*	1.85
Canadian Blue	*Poa compressa*	1.72
Meadow Fescue	*Festuca pratensis*	1.57
Rhode Island Bent	*Agrostis canina*	1.47
Meadow Foxtail	*Alopecurus pratensis*	1.38
Red Top	*Agrostis vulgaris*	1.28
Yellow Oat	*Avena flavescens*	1.20
Kentucky Blue	*Poa pratensis*	1.17
Fine-Leaved Sheep's Fescue	*Festuca ovina*	.92
Perennial Rye	*Lolium perenne*	.90

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The Western Rye Grass, Virginia Lyme Grass, Fringed Brome Grass, Bearded Wheat Grass, and Canadian Lyme Grass are all native of North America. The seed for our experiments was obtained from Manitoba. Dr. Jas. Fletcher, Botanist at the Central Experimental Farm, Ottawa, in referring to the Western Rye Grass in his report for 1898, states that it has given most satisfactory results as a hay and pasture grass, and also states that "Mr. S. A. Bedford, Superintendent of the Brandon Experimental Farm, who has grown it (Western Rye Grass) for many years has always spoken of it in the highest terms. This is also the case with Mr. Angus McKay at Indian Head, and with some others who have tried this grass." It will be observed that the Western Rye Grass gave upwards of one ton per acre more than the timothy, and that the timothy gave practically one ton per acre more than the Awnless Brome Grass (Bromus inermis).

Besides testing the varieties during the past summer for the production of hay, another experiment was carried on in order to glean some information regarding the amount of pasture material produced by each of the varieties on certain dates. All of the different kinds of grasses were cut for this purpose on June 6th, and again on August 3rd. In the first cutting it was found that the Virginia Lyme Grass, Tall Oat Grass, Timothy, Western Rye Grass, and Orchard Grass gave the largest yield per acre in the order named. In the second cutting it was found that the Canadian Lyme Grass, Tall Oat Grass, Bearded Wheat Grass, Western Rye Grass, and Red Top, gave heaviest yields, also in the order named above. Although the Virginia Lyme Grass gave the largest yield at the first cutting, its after-growth was very poor. In the case of the Tall Oat Grass and the Western Rye Grass, however, the yield was good, not only at the first, but also at the second cutting. The Tall Fescue Grass, which is not mentioned in the above table, gave excellent satisfaction in both the first and the second cutting. The results of this experiment furnish information regarding the varieties which would likely give the best satisfaction for pasture purposes. This line of investigation will likely be followed up.

Varieties of Clovers.

In the spring of 1894, several varieties of clovers were sown in the experimental department, and the average yields per acre obtained in the two following years were given in my report for 1896. A similar experiment was started in 1899, by sowing sixteen varieties of clover in uniform plots in the experimental grounds. Each of these clovers produced one, two, and three crops in the present year. The yields of hay per acre of the varieties which gave the best satisfaction were as follows: Lucerne, 4.6 tons; Bokhara or Sweet Clover, 4.5 tons; Mammoth Red, 3.2 tons; Common Red, 3.1 tons; Alsike, 3.0 tons; Sutton's Giant Perennial White, 2.1 tons; White or Dutch, 1.8 tons; Yellow Trefoil, 1.4 tons. The Lucerne gave three cuttings, the yields per acre being as follows: First cutting, 2.3 tons; second cutting, 1.5 tons; and third cutting, .8 tons. The second cutting of the Common Red gave one-half a ton of hay per acre, while that of the Mammoth Red and Alsike was each less than one-tenth of a ton of hay per acre.

Grasses and Clovers Sown in Different Ways.

An experiment has been in progress during the past few years in which grasses and clovers have been sown in the autumn, both alone and with winter wheat, and also in the spring, both alone and with oats. The experiment is not yet sufficiently advanced to give the details, but the results so far go to show that good satisfaction has been obtained from each method, except from sowing the clovers in the autumn of the year, and especially from sowing them alone. The Common Red Clover, Mammoth Red Clover, Alsike Clover, and Lucerne, have all been badly winter-killed when sown in the autumn. The largest yields have been obtained from those plots upon which the grass seed and clover seed were sown alone in the spring of the year.

Mixtures of Grasses and Clover for Hay.

Although a considerable amount of experimental work has been done in testing different grasses and clovers for hardiness, yield of crop, etc., but little has been done in our College, until recently, in trying to find out the best mixture of grasses and clover

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for the production of hay. In the spring of 1897 twenty-one mixtures of grasses and clovers were sown with a grain crop. Crops were taken from the twenty-one plots in 1898 and in 1899. An experiment similar to this was again started in 1898 by sowing similar mixtures on twenty one other plots. These plo's produced two crops in 1899 and also in 1900, and a few of them produced three crops the second year. There were four grasses and four clovers used in this experiment. The grasses were Timothy, Meadow Fescue, Tall Oats and Orchard; and the clovers were Common Red, Mammoth Red, Alsike and Lucerne. Each mixture was made up of either one grass and one clover, two grasses and two clovers, or four grasses and four clovers.

From the results obtained from these experiments it is found that the three mixtures which produced the largest average yield of hay per acre were as follows: 1. Tall Oat Grass and Lucerne, 3.18 tons; 2. Tall Oat Grass, Orchard Grass, Mammoth Red Clover and Lucerne, 3.09 tons; 3. Timothy and Lucerne, 3 07 tons. All others gave less than three ton per acre per annum. The lightest yields were produced from mixtures having Orchard Grass, as the Orchard Grass was quite badly killed during the second winter of each experiment. It will be seen that Lucerne was in each of the three mixtures which gave the largest yield of hay per acre. In the average results of the first year's crop, after seeding, the Tall Oat Grass and the Mammoth Red Clover gave the largest yield of hay (3 tons) per acre at the first cutting; and the Orchard Grass and Lucerne gave the largest yield of hay (1.04 tons) per acre at the second cutting. In the average results of the second year's crop after seeding, the Timothy and Lucerne gave the largest yield of hay (2.43 tons) per acre at the first cutting; and the Tall Oat Grass and Lucerne gave the largest yield of hay (.48 tons) per acre at the second cutting. The only mixtures from which there was a third cutting in the one season were those mixtures in which Lucerne was used. That mixture which gave the largest yield of hay in the third cutting was composed of Tall Oat Grass and Lucerne.

Mixtures of Grasses and Clovers for Permanent Pasture.

In the spring of 1894 two mixtures of grasses were sown on plots side by side in order to ascertain the comparative value of the two mixtures for producing grass over a considerable number of years. On some farms there are certain fields which are situated a long distance from the buildings, or which are mostly composed of hillsides, etc., which seem better suited for permanent pasture than for almost any other purpose. Although the grass on the plots of the experiment here mentioned has not been pastured, but has been cut two or three times per season, we still believe that some good information is being secured regarding the comparative value of the different mixtures for pasture purposes. It allows us to ascertain the comparative yield of the different crops, the comparative hardiness of the separate grasses when sown in mixtures, and the amount of aftermath from each mixture in each year. The following gives the name and the amount of seed used of each variety in each mixture:—*Mixture No. 1.*—Meadow Fescue, 6 lbs.; Meadow Foxtail, 3 lbs.; English Rye, 2 lbs.; Timothy, 3 lbs.; Canadian Blue Grass, 4 lbs.; Orchard Grass, 3 lbs.; Red Top, 2 lbs.; Yellow Oat, 2 lbs.; Lucerne, 4 lbs.; White Clover, 2 lbs; Alsike Clover, 2 lbs.; Red Clover, 1 lb.; and Trefoil, 1 lb., making a total amount of 35 lbs of seed per acre; and *Mixture No. 2.*—Orchard Grass, 4 lbs.; Meadow Fescue, 4 lbs.; Tall Oat Grass, 3 lbs.; Timothy, 2 lbs.; Meadow Foxtail, 2 lbs.; Lucerne, 5 lbs.; Alsike Clover, 2 lbs.; White Clover, 1 lb.; and Trefoil, 1 lb., making a total amount of 24 lbs. of seed per acre. The average results for six years show that the yields of hay per acre from each of the two mixtures were as follows:—Mixture No. 1, 2.9 tons; mixture No. 2, 3.6 tons. These results show that mixture No. 2 gave considerably the largest amount of crop per acre. All the varieties in mixture No. 2 are exceedingly hardy and for general purposes it is one of the best and most permanent mixtures we have found

Varieties of Millet for Hay.

Upwards of thirty-one varieties of millet have been grown under experiment at the College within the past twelve years. Of this number, fourteen have now been grown for six years in succession and the weight of both the green crop and of the hay produced by each variety has been determined in each of the six years. These varieties belong to

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four distinct classes, as will be seen by the classification here made. The following list gives the average yield of hay per acre of each variety for the six years :—

	Tons of hay per acre.
1. Broom-Corn Millets. (*Panicum miliaceum.*)	
Japanese Panicle	5 9
White French	3 5
Red French	2 9
2. Foxtail Millets. (*Choetochola italica*)	
Holy Terror Gold Mine	5 7
Golden Wonder	5.3
Japanese Common	*5.0
Magic	4 8
German or Golden	4 7
Hungarian	4.6
Salzer's Dakota	4 5
Common	3.9
California	3.9
3. Barnyard Millets. (*Panicum crus galli.*)	
Japanese Barnyard	5.4
4. Pearl Millets. (*Pennisetum typhoideum.*)	
East India Pearl	6 0

*Results for five years only.

Although the Japanese Panicle millet and the Red French millet are two varieties very similar in their character of growth, it will be seen from the figures here presented that the former variety has given fully double the yield of hay per acre as compared with the latter variety. The Hungarian Grass, which is so well known over Ontario, has given an average yield of 1.3 tons of hay per acre less than that produced by the Japanese Panicle variety. The East India Pearl millet usually produces a good yield, but it requires such a long season for growth that it scarcely ever produces heads when grown in our experimental plots. As this was an exceptionally favorable season, some of the plants produced heads, but none produced ripe seed.

Varieties of Rape, Kale, Cow Cabbage, Etc.

An interesting experiment has been conducted during the past four years by growing crops which much resemble rape in character of growth and of crop. The crops were weighed immediately after they were cut in each year of the experiment. The following figures give the average results for four years :

Varieties.	Average height of crop in inches.	Average No. of tons of green crop per acre.
Dwarf Essex Rape	27.5	22.1
Cow Cabbage or Marrow Stem Kale	30 4	21 4
Victoria Rape	25.5	19 7
Thousand Headed Kale	27.8	17 3
Tall Jersey Cabbage	29.5	15 8
Brussels' Sprouts	18.8	13.8
Tall Green Curled Scotch Kale	18.9	12.3

It will be seen from the foregoing results that the Dwarf Essex variety of rape stands at the head of the list in yield of green crop per acre. There is no other variety of rape which has given nearly so good satisfaction as the Dwarf Essex. The German Summer (Birdseed Rape) should never be grown for agricultural purposes, as it seeds the same season in which it is sown, and is, therefore, a variety poor in feeding properties

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and difficult to eradicate. This point should be carefully observed, as serious trouble has sometimes resulted from sowing large areas of the German Summer rape. The Dwarf Essex rape makes an excellent late summer and autumn crop for fattening cattle, sheep and lambs, for which purpose it has been used extensively in the farm department of the College. When rape is pastured by hogs, a good deal of it is wasted; and when fed to cows it is apt to give the milk an undesirable flavor. Rape grows best in cool weather. When sown on land where a cereal crop has been harvested, it frequently makes a good growth of plants, which can be plowed under as a green manure or used as a late fall pasture. Owing to its broad and spreading leaves, rape has a wonderful power for smothering weeds, and is, therefore an excellent crop for clearing the land.

Besides the seven varieties previously enumerated, others have been tested for a shorter length of time. Jersey Kale and Georgia Collards have been grown for three years in succession, the first giving an average yield of 13.7 tons, and the latter variety 11.6 tons of green crop per acre. Hardy Curled Kale, White Mustard, Sutton's Best of All Savoy Cabbage, Earliest Sheepfold Cabbage, Earliest Drumhead Cabbage, Latest Drumhead Cabbage, and Purple Sprouting Yoroccoli have each been tested in the expermental grounds for two years in succession. Of these seven varieties, the largest yields of green crop per acre were produced by the Earliest Drumhead Cabbage 11.9 tons, Earliest Sheepfold Cabbage 10.4 tons, Sutton's Best of All Savoy Cabbage 9 6 tons, and Purple Sprouting Yoroccoli 9.2 tons. In one year's experiments with Swiss Chards, Creole Curled Mustard, Giant Southern Curled Mustard, and Bloomsdale Long Leaved Mustard, it was found that the Swiss Chards gave a yield of 7.3 tons of green crop per acre, which was about three tons per acre more than the green crop produced by either of the three varieties of Mustard here mentioned. One of the greatest advantages of the Mustard is, that it is a very rapid grower when sown late in the season, and forms a good pasture for sheep. A small quantity of some of the cultivated varieties of mustard is sometimes sown with rape in the Old Country in order to prevent the lambs from bloating when pastured on the green crop.

We have tried to be accurate in every detail of our work, and hope that the record of the results presented may prove of real service to the farmers of Ontario.

I wish to thank both yourself and the Minister of Agriculture for the kindly support given me in the further advancement of the work of the Experimental Department. I also wish to draw attention to the valuable assistance rendered the department by Mr. A. Whiteside, my foreman in the outside work, and my assistant, Mr. J. Buchanan, B. S. A.

Respectfully submitted,

C. A. ZAVITZ,
Experimentalist.

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PART XII.

REPORT OF THE MANAGER OF THE POULTRY DEPARTMENT.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of presenting herewith the report of the Poultry Department for the year 1900. This year more work has been done than usual in this department, especially along the line of rearing early broiler chicks and ducks and fattening chickens or our home trade.

Much correspondence has been necessitated on account of the rapidly growing desire among farmers for further knowledge about poultry. The ordinary work of the department is increasing, and demands much more time than it has heretofore. As the number of birds raised has been considerably increased, and much more experimental work has been done the work of the manager has been, at times rather laborious. Much better and more work could be accomplished, had we some reliable assistance, as under the present circumstances only as much work can be undertaken as the manager has time to do personally.

INSTRUCTION.—Lectures were given to the first year on the location and the construction of poultry houses, the rearing of chickens naturally and artifically, the diseases of poultry and their treatment, and the general characteristics of the breeds we have in the department.

The lectures to the second year were on the fattening and dressing of poultry for the home and the export trade, and the selection, mating, and judging of poultry for both fancy and utility purposes. Lectures were also given to the dairy class.

EGG PRODUCTION.

The production of eggs is one of the most important branches of the poultry industry and is at times not the least perplexing. Under proper conditions, it is fairly easy to get eggs during the winter months; but the absence of any one of these conditions makes the task rather difficult. The most important points are,—

(a) To have good, healthy, well-matured young hens that are of a laying family. Yearling hens that have molted early, and early hatched, well developed pullets are the most likely layers. Any others that may be in the flock should be discarded, when winter eggs is the object in view.

(b) To have a comfortable house, with at least five to six square feet of floor space for each bird.

(c) To feed on good nourishing food and have plenty of pure, fresh water accessible a all times.

These are the most important requisites, and when they are all present, good results are fairly certain to be obtained.

Methods of Feeding in Winter.—We practice a method somewhat different from the ordinary practice. Our experience in feeding warm mashes in the morning is that, unless the feeder is exceptionally careful, the fowls gorge themselves, and as a result take to the roost for the greater part of the day,—which is more favorable to the production of fat than of eggs. A hen must be in good condition when laying, and the amount of flesh must be sustained, if continued laying is desired; but excessive fat is generally more harmful than a slight reduction in weight. In order to determine a hen's condition, it is usually advisable to weigh one or two birds in each pen every two weeks or so. While it is true that an experienced poultryman can tell by lifting the fowl whether they are losing in weight or not, yet the scales are the only accurate and reliable test. The first feed in the morning is given about nine o'clock and consists of a handful of whole grain, usually wheat, to every three birds. This is well scattered in the litter on the floor. Previous to this, the birds have been kept busy digging in the litter for the few morsels that may have been left from the evening meal of the previous day. When the forenoon is nearly gone, the fowls are given a little cut bone or cooked meat each day, and, in addition, all the pulped roots, such as turnips or beets that they will eat. The amount of bone or meat given is

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small, the object being to give about two and one-half pounds to every sixteen hens during a week's time. A little whole grain is given soon after one o'clock, either barley or oats, not more than three handfuls to a dozen hens, the object being to induce exercise. If the hens are losing in flesh less exercise is given. In such cases a larger feed is given early in the morning and the noon feed of grain is generally omitted. The mash is given about four in the afternoon,—not that good results cannot be obtained where no mash is given, but because the mash is a convenient form of balancing the ration, and it adds variety to the food. The mash is composed of equal parts by measure of stale bread, corn meal, bran, ground oats and clover meal, or lawn clippings. These are dampened with skim-milk or water, according to the abundance of the former. This should be fed warm, if possible, and given in as large quantities as the fowls will eat. After having all the mash they desire, the fowls are given a little whole grain, and whatever may not be consumed at night will be eagerly sought after next morning, and be a means of giving exercise which produces warmth. This method of feeding induces sufficient exercise, leads to the eating of vegetables, prevents excessive fat, promotes health and generally results in a fair production of eggs. It also prevents feather-pulling and egg-eating, —troubles which are in many cases due to lack of exercise or the absence of some egg-forming material in the foods given.

Eggs were received in fair numbers last winter ; and the record at the present time (Jan. 1st, 1901) is quite satisfactory.

The White Langshans, Plymouth Rocks and Wyandottes proved to be superior winter layers. Andalusians and Leghorns did the best during the summer months.

As an example of the value of well developed pullets, as compared with old hens, the following record is given :—

Ten well developed pullets laid an average of 122 eggs each during the year. Four dozen of these were laid before the middle of March. Three of the pullets were allowed to hatch and rear a brood of chickens.

Twelve hens (Barred Plymouth Rocks, one to three years of age), laid an average of 84 eggs each, about a dozen of which were laid before the middle of March ; and five were allowed to hatch and rear broods of chickens.

Trap nest boxes have been used during the season, to a limited extent ; and there is no doubt as to the value of these nests when one is desirous of building up a flock of good layers, as it clearly shows the drones as well as the heavy producers. It is equally valuable in breeding exhibition stock, which requires sure and accurate pedigree breeding. It is quite true that these boxes require considerable attention ; but the results far more than repay the time taken in recording the number of eggs laid. By the use of these nests, we found that one hen in the pen did not lay a single egg, although always bright and vigorous ; another did not lay more than seven eggs before becoming broody ; while still another never showed the least inclination to sit. This last hen laid 180 eggs during the nine months in which the box was in the pen.

There is no doubt but that many of pens would make a much better average egg production were it not for the handling by students from January to April, and the constant disturbance by excursionists during the month of June. This is particularly true of the lighter and more excitable breeds, such as the Andalusians and Leghorns. In order to have fowls do well, they must be very carefully handled, and rough treatment or frightening is always to be avoided.

Hatching Season.

Eggs were not so fertile as usual this season, nor was the vitality of the germs so strong as in previous seasons. This was a general complaint from all parts of the country, and appeared to be chiefly due to the cold weather during the month of March. The fowls appeared to have suffered much from the long confinement, and it was only those who had conditions such that their stock could exercise in the open air that were successful in getting large hatches early in the season. It is claimed by some that hens which are rced to lay during the winter, lay eggs lacking in vitality during the spring. They con-

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sider that the hen's constitution is not equal to the excessive strain of constant egg-production, without impairing the fertility of the eggs produced. Our observations on two pens of pullets—one of early hatched birds, laying well during the winter, and the other of late-hatched birds, laying but little during the winter, do not support this claim.

There is room, however, for much experimental work along these lines. The question is a serious one for broiler raisers, and it undoubtedly requires close observation. I am of the opinion that had the fowls in our Poultry department been able to take exercise out of doors, on manure piles or in open sheds protected from cold winds, we should have had a much larger percentage of fertile eggs. Hence I ask for a small appropriation for the construction of a house on this plan.

The first incubator was started on January the 16th, with 158 eggs, from which 49 chickens were hatched. The percentage of fertile was not high, and there was a number of weak germs among those that were fertile. During the early part of the season the germs were much stronger than in March. The percentage of strong germs in the fertile eggs did not increase much until about the 20th of April. Eggs laid after that date hatched as high as 78 per cent. The average for the season was 51 per cent.

Hens vs. Incubator.

There was but little difference in the percentage of eggs hatched by hens or by the machine. The latter gave a slightly higher percentage of chicks. When one wishes to raise over one hundred chickens the incubator will, in most instances, give better satisfaction. The machine requires much less attention than the number of hens required to cover an equal number of eggs, and there is no worry about vermin when the machine is used. Where brooders can not be secured for rearing the chickens hatched by the machine, little difficulty will be found in getting broody hens to mother the chicks. Hens that have been broody for a few days will take the chickens readily if one or two eggs are removed from the machine just before hatching and placed under the broody hen. When the chicks are ready to be taken from the machine, place them under the hen at night and in nearly all cases the hen will mother them well. Our experience is that it is seldom advisable to give a hen more than fifteen chickens. Where more are given, the weaker ones are usually killed by their more vigorous comrades. We used the above plan to advantage during the latter part of May, when all our brooders were filled with older chickens.

Rearing Early Broiler Chickens.

As mentioned in a previous paragraph, our first chickens were hatched during the first week of February, the eggs having been set Jan. 16th. When the chickens were about 36 hours old, they were removed to a hot air brooder, the temperature of which was a little over ninety degrees, Faranheit, at which temperature it was kept during the first week. The first feed consisted of hard-boiled eggs (chopped fine), bread crumbs and finely chopped raw onions, in about equal proportions. This was fed for the first four or five days, after which they were gradually weaned from hard-boiled eggs to cooked liver (chopped); and, to a certain extent, from breadcrumbs to a mixture of grain in equal proportions of bran, oatmeal and cornmeal, slightly moistened with skim-milk, care being taken to avoid sloppiness, and a little grit being added occasionally. By way of vaiety, the onions were, at times, omitted; and, in their place, root sprouts and sprouted grains were used. Our aim throughout the whole period was to feed nearly equal proportions of animal, green vegetable, and grain foods.

After the chicks were ten days old, they were induced to take exercise by feeding cracked wheat or millet seed, scattered in cut straw over the floor. Good pure water was at all times in easy access. They were fed five times a day in just such quantities as were readily consumed. The chickens were occasionally driven into the open air because of our conviction that more or less fresh air is necessary to the production of strong healthy chickens.

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These chickens were all successfully raised, and were exceptionally thrifty. A dozen were killed on May the 4th and shipped to Toronto, where they were sold at $1 per pair. At that time, their average weight was about one and one-half pounds each.

Later in the season (up till 9th June) some more broilers were shipped, and sold for the same price, viz., $1 per pair.

The shipment sent on the 9th June brought 80 cents per pair.

Rearing and Marketing Ducks.

Our first ducks this year were hatched April the 20th, and sold July the 5th in Toronto by a commission merchant for $1 per pair. These were of the Pekin variety, and weighed when dressed nearly nine and a half pounds per pair. Another shipment was made July the 17th, which sold for 75c per pair. This shipment was equal in quality to the first shipment, the difference in price being caused by the amount of a similar class of fowls offered for sale at that time.

Feeding.—The ducks were fed on a mixture of equal parts of bran, corn meal, and ground oats, moistened with skim-milk. About twice a week grit was added to the feed in the proportion of about one-half pint to a peck of grain. This is necessary to secure good digestion of food. Water was given for drinking purposes only, as ducks grow much faster when not allowed to swim in water.

Breeds.—The Pekin variety proved to be the best market duck. They mature earlier than other varieties, and having a creamy white plumage they present a nice appearance when dressed.

The Cayuga was, on the average, one-half pound less in weight after nine weeks' feeding. They are also inferior to the Pekins when dressed, being somewhat dark in appearance, owing to having black plumage. Their flesh, however, is said to be of superior quality, having a better flavor than that of the other breeds.

The Rouen ducks were large when matured, but grew rather slowly, not weighing over eight and one-half pounds to the pair when nine weeks old. Their colored plumage is also a disadvantage when they are dressed.

A cross between the Pekin and the Rouen was tried, but proved to be but little superior in growth to the Rouen. It, however, dressed better in appearance, owing to the large proportion of white in the plumage. The Pekin drake was mated with high grade Rouen ducks.

The dealer in Toronto pronounced the Pekin the most desirable market duck.

Fattening Chickens.

Considerable work has been done during the past year in the fattening of chickens for our home markets. Since September, nearly four hundred birds have been fed and killed. Some of these chickens were pure bred, other were grades of such breeds as the Plymouth Rock and Wyandotte, and a few were the common barn-yard fowl.

Fattening was commenced September the 10th. Ninety-six grade chickens were placed in the fattening coops. They were divided into eight groups of twelve birds each. These birds were fed from the small V-shaped trough arranged in front of each coop, for three weeks, after which they were starved for thirty-six hours so as to empty thoroughly the crop and intestines; and then they were killed. The cramming machine was not used with these birds. The food was mixed with cold water, as skim milk could not be obtained. Eight different rations were used as follows:

These chickens did not do so well as those that were fed later in the season, owing to their being small. If they had weighed about four pounds each no doubt much better gains would have been made. They also suffered from the heat. It will be remembered that September was a rather warm month. We were also obliged to feed with water instead of milk, which may have had some little influence in reducing the gains. Cut bone was given about twice a week in the proportion of one-half pound to each group of 12 chickens.

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It will be noticed from the table that fine ground oats are superior to coarse ground, owing largely to the fact that the finer ground oats are relished better. Coarse ground oats were not readily consumed and some of the food was wasted by the chickens picking for the finer portions.

Rations.	Weight when put into crates.	Gain in three weeks feeding.	Food consumed.	Cost per lb. gain.
GROUP I. Ration consisted of 2 parts barley meal, 2 parts corn meal and 1 part fine ground oats	36 lbs.	9 lbs.	46 lbs. 13 oz.	5.63 cts.
GROUP II. Ration consisted of 2 parts ground wheat 2 parts finely ground oats, and 1 part corn meal	34 lbs. 8 oz.	7 lbs. 8 oz.	44 lbs. 6 oz.	7.39 cts.
GROUP III. Ration consisted of 2 parts corn meal, 2 parts buckwheat meal, and 1 part finely ground oats	33 lbs. 8 oz.	11 lbs.	53 lbs. 4 oz.	5.61 cts.
GROUP IV. Ration consisted of 2 parts finely ground oats, 2 parts corn meal, and 1 part pea meal	36 lbs.	12 lbs.	55 lbs. 4 oz.	5.15 cts.
GROUP V. Ration consisted of very finely ground corn	35 lbs.	5 lbs.	35 lbs. 1 oz.	8.2 cts.
GROUP VI. Ration consisted of coarsely ground corn meal	32 lbs.	6 lbs.	38 lbs. 2 oz.	6.63 cts.
GROUP VII. Finely ground oats	34 lbs.	9 lbs.	43 lbs. 11 oz.	5.6 cts.
GROUP VIII. Ordinary ground oats	34 lbs.	5 lbs.	41 lbs. 14 oz.	8.3 cts.

The chickens of groups III. and IV. ate their rations more readily than those of any of the other groups. They also made the best gains at the least cost.

The chickens of group I. made a pound of gain fairly cheaply, but the ration was not relished. Hence the pounds of gain are few.

Those of group II. were unthrifty. The ration was not relished. When wet it was pasty and seemed somewhat indigestible.

Those of group V. refused to eat the fine ground corn, except in such quantities as would sustain life. This ration proved a very undesirable one.

Those of group VI. ate the coarse ground corn-meal fairly well, but it proved to be are unsatisfactory ration for such small birds, especially during the warm weather.

These chickens were sold in Toronto and Montreal, netting here nine and ten cents a pound, respectively. They were bled, but not drawn. The dealers pronounced those in groups III. and IV. to be best suited to their trade.

The second lot of chickens to be fattened were put into the coops early in October, and were fed for twenty-four days, two weeks from the V-shaped trough and ten days from the cramming machines. This lot of chickens was over seventy-five per cent. pure-bred Plymouth Rocks. As in the first lot there were ninety-six birds, divided into eight equal groups.

The buckwheat ration (Group III.) was the most satisfactory. The birds ate this food with a relish and gained rapidly at a small cost per pound.

The ration containing potatoes (Group VIII.) is an economical one, and satisfactory where potatoes are in abundance.

Fine ground oats (Group V.) is not relished so well as the two rations previously mentioned. It is also much more difficult to procure. In a few cases indigestion was caused by the hulls of the oats.

The ration containing wheat (Group II.) was very unsatisfactory. In both trials one bird died of indigestion, and the food was not relished.

The rolled-oat ration (Group VI.) is much the same as the fine grounds oats, so far as the general results are concerned.

The ration containing barley (Group I.) produced a pound of gain very cheaply, but it was lacking in the number of pounds of gain.

The ration in Group IV. containing peas is a fairly good one, and is relished fairly well.

The ration made up of corn and oats (Group VII.) is also a fairly good one, especially where birds weighing from five pounds each and upwards are to be fattened.

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The third lot of chickens, most of which were low-grade barnyard fowl, were put into the coops early in November. These were also divided into eight groups of 12 birds each. The following table shows the rations used, food consumed, amount of gain, and cost of a pound of gain for both lots. It also shows the gain of the lot containing the large number of pure-bred birds in comparison with the scrub lot. Both lots were fed the same in every respect.

Rations.		Weight when put into crates.	Weight after being fed from V-shaped trough for two weeks.	Food consumed. Grain.	Food consumed. Milk.	Gain from two week's feeding from V-shaped Trough.	Cost per pound of gain.	Amount of gain from ten days' cramming.	Total gain from three weeks' feeding.	Cost per pound of gain when finished.
		lbs.	lbs.	lbs. oz.	lbs. oz.	lbs. oz	cts.	lbs. oz.	lbs. oz.	cts.
Group I. 2 parts ground barley, 2 parts fine ground oats, 1 part coarse corn meal; cost, $1.10 per 100 pounds.	Pure bred	35	52	33 11	20 12	17	2.44	8	25	3.51
	Scrub	47	58	32 2	25 2	11	3.57	8	19	4.25
	Average..	41	55	32 14	22 15	14	3.155	8	22	3.88
Group II. 2 parts fine ground oats, 2 parts coarse corn meal, 1 part ground wheat; cost, $1.18 per 100 pounds.	Pure bred	38	52.5	32 12	30 8	14 8	2.47	2	16 8	4.08
	Scrub	50	58	30 4	30 4	8	5	3 8	11 8	7.52
	Average..	44	55.25	31 8	30 6	11 4	3.735	2 12	14	5.8
Group III. 2 parts coarse ground corn, 2 parts ground buckwheat, 1 part fine ground oats; cost, $1.16 per 100 pounds.	Pure bred	43.5	67	37 8	34 8	23 8	1.83	4	27 8	3.36
	Scrub	56	73	45 4	44	17	3.2	3 8	20 8	5.12
	Average..	49.75	70	41 6	39 4	20 4	2.015	3 12	24	4.24
Group IV. 2 parts fine ground oats, 2 parts coarse ground corn, 1 part ground peas; cost, $1.12 per 100 pounds.	Pure bred	42	61	29 8	34 12	19	2	2	21	4
	Scrub ...	51	60	36 12	44	9	5.28	5	14	6.87
	Average..	46.5	60.5	33 2	39 6	14	3.64	3 8	17 8	5.4
Group V. Fine ground oats; cost $1.20 per 100 pounds.	Pure bred	43.5	63	37 2	42 8	19 8	2.51	3	22 8	4.22
	Scrub	50	60	28	34 8	10	3.86	5	15	5.81
	Average..	46.75	61.5	34 9	38 8	14 12	3.85	4	18 12	5.01
Group VI. Low grade rolled oats; cost $1.25 per 100 pounds	Pure bred	45	65	30 4	30 8	20	2.1	2	22	4
	Scrub	53.5	62.5	31	31	9	4.8	5	14	6.58
	Average..	49.25	63.75	30 10	30 12	14 8	3.45	3 8	18	5.29
Group VII. 2 parts coarse ground corn, 1 part fine ground oats; cost, $1.13 per 100 pounds.	Pure bred	53.5	75	34 8	34 8	21 8	2	4	25 8	3.51
	Scrub	48	58	34	34	10	4.3	7	17	5.36
	Average..	50.75	66.5	34 4	34 4	15 12	3.15	3 8	21 4	4.43
					Pota'es. / Milk.					
Group VIII. 2 parts coarse ground corn, 2 parts fine ground oats, 2 parts cooked potatoes; grain cost $1.15 per 100 pounds; potatoes cost 35 cts. per bag.	Pure bred	41	63	25 8	12 / 35 8	22	1.85	3	25	3.47
	Scrub	50	62	25	12 / 37	12	3.5	5	17	5.36
	Average..	45.5	62.5	25 4	12 / 36 4	17	2.67	4	21	4.41

N.B.—All rations were mixed weight.

It was not possible to use many of these foods in the cramming machine, owing to the grains being too coarse. All groups were crammed with a mixture of two parts fine ground oats and one part ground buckwheat, mixed with twice its weight of skim-milk.

Where it is not possible to obtain the fine ground oats, shorts and buckwheat, finely ground, may be used in the cramming machine.

Food to be used in the crammer must be about the consistency of gruel and of such a nature that the solids and liquids will not separate when allowed to stand. In order to use cornmeal alone, it is necessary to have it cooked.

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M A K REPORTS.

These chickens were killed and shipped, part to Montreal and part to Toronto. The dealers were asked to report on the quality of the flesh, and also as to what color of flesh they preferred, together with the most desirable weight of birds for their respective trades. Mr. Henry Gatehouse, 810 Dorchester street, Montreal, reports as follows:

MONTREAL, November 23, 1900.

DEAR SIR,—Enclosed you will please find return of poultry shipped to me. I am allowing you ten cents per pound all round and paying charges on same. I trust you will find this satisfactory. As to weight, I find chickens weighing from four to six pounds are most in favor with my customers.

If you have any more of this class of stock to dispose of, and my prices are satisfactory to you, I am willing to take all you have to sell.

Very truly yours,

H. GATEHOUSE.

The chickens shipped to Toronto were sold by the Wm. Davies Co., and were reported on by Mr. Jno Porter. These reports were gathered from their numerous branch stores. The following are fair samples of the many reports sent in by the branch stores:

"The chickens from Guelph were exceptionally fine; they sold readily for 12½ cts. per pound. We had two customers back this morning saying, they had never eaten nicer birds."

"I find that a chicken of a light cream color is preferable to a dark yellow, and a chicken weighing from four to five pounds is a better seller than a smaller one."

"Quality very uniform; all sold at 14 cts. per pound."

"The chickens I received from Guelph Farm were highly satisfactory in every respect. They were very fleshy, without being too fat. Taking them all round, they were the nicest stock I have had in the store."

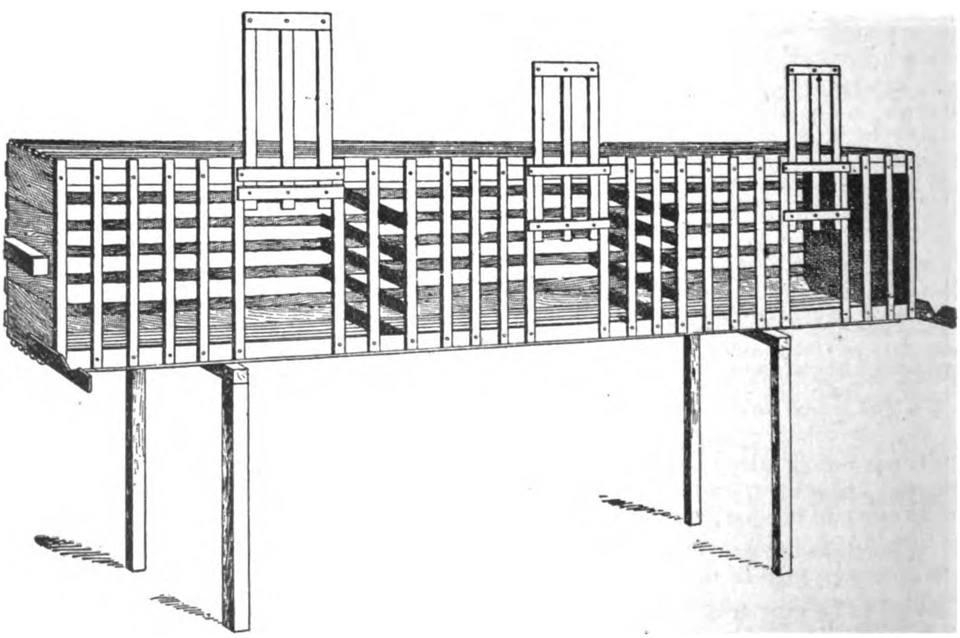

FIG. shows a single crate or coop.

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CRAMMED *versus* NATURAL FED CHICKENS.

It is sometimes asked if it pays to use the cramming machine. To answer this question, a lot of some fifty chickens which had been feeding from the V-shaped trough for two weeks, were divided into two groups.

The first group was fed for the next ten days from the V-shaped trough, and the other group from the cramming machine. The conditions and the feed were the same in every particular.

The chickens that were fed from the trough consumed in ten days' feeding forty pounds of grain and an equal amount of milk. The grain cost $1.20 per 100 lbs. The milk, 10 cts. per 100 lbs. The total cost of feeding being 52 cts. They gained five pounds in weight, and the cost per pound of gain was 10.2 cts.

The chickens fed by the cramming machine consumed fifty pounds of grain and a hundred pounds of milk, which, at above prices, would cost 70 cts. The amount gained was seven pounds eight ounces, and the cost per pound of gain for this lot was 9.33 cts.

When ready to kill each bird was carefully numbered, so that there would be no mistakes as to lot to which each chicken belonged, and after being dressed, they were divided into two lots, one of which was shipped to Montreal and the other to Toronto. The dealers were asked to give, if possible, the values or selling price of each chicken in their reports. Those going to Montreal had in addition to individual numbers, marks as lot 1 and lot 2.

The dealer in Montreal reported lot 2 to be the most desirable chickens, but made no discrimination in price between the lots.

Lot 2 were the birds fed from the cramming machine.

The dealer in Toronto furnished the following report:

No.	Weight.	Price per lb. obtained.	Remarks.	Breed.	How fed.
	lbs.oz.				
87	4.	12	Light cream color, high breast bone, not enough meat........	grade	From trough
88	4.10	11	" " could stand more meat	P. Rock	" "
108	4.7	12½	" " enough meat and not too fat..............	grade	" machine
90	5.2	12½	" " enough fat, lots of meat	P. Rock	" trough
104	3.	12	" " small frame, fat enough, could stand more meat...	grade	" "
91	3.12	12	" " small frame, could stand more meat.	scrub	" machine
95	7.4	14	" " lots of meat and not too fat, exceptionally fine bird..........................	P. Rock	" "
107	3.4	12	" " small frame, could stand more meat, enough fat........................	grade	" trough
97	5.	13	" " nice and plump, not too fat.....	grade	" machine
89	4.4	12½	" " nice and plump, not too fat.	grade	" "
101	4.8	12½	" " not much fat, could stand more meat	P. Rock	" trough
103	3.6	12	" " enough fat, could stand more meat........	grade	" "
102	5.5	13	" " lots of meat and not too fat...............	P. Rock	" "
105	4.	12½	" " fat enough, good frame, could stand more meat.	grade	" "
98	3.10	12	" " fat enough and quite a lot of meat for so small a frame	grade	" machine
38	4.2	12½	" " very thin and a crooked breast bone......	scrub	" trough
39	4.2	12½	" " could stand more meat, also more fat. . ..	grade	" "

In some instances, the numbers were removed or otherwise lost, in which cases no report is given. By taking the average weights of the two lots when they were weighed here, we find that the machine-fed chickens were about one-half pound each heavier, and in the report from Toronto it will be noticed that the average price of the crammed chickens is nearly three-quarters of a cent per lb. higher than the price of the others.

SUMMARY.

1. Scrub, or barn yard, fowls are very poor feeding and selling class of stock.
2. Crammed chickens are more MEATY than those fed from the trough.

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3. As a rule, pure-bred chickens of general purpose varieties are a better selling class of stock than scrubs or low grades.

4. Heavy chickens sell best.

For the information of those who have not seen fattening crates, I submit the following cut and description of the ones we use:

"1. The crates in which the fattening is carried on are six and a half ($6\frac{1}{2}$) feet long by sixteen (16) inches square, inside measurement. Each crate is divided into three compartments, and each compartment holds four or five chickens according to their size. The crates are made of slats running lengthwise on three sides up and down in front. The slats may be from 1 inch to $1\frac{1}{2}$ inches wide by $\frac{5}{8}$ inch thick. The spaces between the slats in front should be two inches wide to permit the chickens to get their heads through for feeding. The slats on the bottom should be put on $\frac{3}{4}$ of an inch apart. Each compartment has a small sliding door in front.

2. The crates are placed on stands about $2\frac{1}{2}$ or 3 feet from the ground. The droppings from the chickens in the crates are received on sand or some absorbent material below.

3. A light "V" trough, $2\frac{1}{2}$ inches inside, is placed outside of each crate running the whole length of it. The bottom of the trough is about level with the floor slats of the crate."

NOTE.—These crates might be improved upon by building them two inches higher.

EGG PRESERVATION.

Several methods of preserving eggs have been tested during the year. The eggs for this purpose were taken early in June, and were tested in December. Many of the same methods that proved fairly successful last year were again tried.

Method No. 1.—A solution was used composed of one part water glass (sodium silicate) and five parts water that had been previously boiled. This was a very strong solution, and unless an egg was absolutely fresh, it would not sink in the solution.

The eggs from this solution were of fairly good flavor, and all were well preserved.

Method No. 2.—This was similar to No. 1, except that eight parts of water were used instead of five parts. The eggs in this were nearly as good eggs as those from No. 1. This is a good preservative where it is desired to keep summer eggs for winter use.

Method No. 3.—This was composed of ten parts of water to one part of water glass. There were no bad eggs in this solution, but the eggs were inferior in flavor and in poaching quality to those kept by methods No. 1 and No. 2.

Method No. 4—This consisted of the same solution as No. 2.; but in place of allowing the eggs to remain in the liquid, they were removed after having been in it for a week, except the last lot which was put into the solution. This lot was allowed to remain the remainder of the season.

(*a*) The eggs, after being in the solution for a week, were removed and placed in an ordinary egg case in the cellar. They were all good when tested, but had evaporated considerably and were lacking in flavor.

(*b*) These were the second lot of eggs to be placed in the liquid. They were handled similarly to those in (*a*), and were of about equal quality.

(*c*) These eggs were allowed to remain in the liquid. They were well preserved, all being good.

They were scarcely equal in quality to those from No. 2 method, but were superior to those from No. 3.

Method No. 5.—A lime solution, made as follows:

Two pounds of fresh lime were slacked in a pail and a pint of salt was added thereto. After mixing, the contents of the pail were put into a tub containing four gallons of water. This was well stirred and left to settle. Then it was stirred thorougly the second time and left to settle; after which the clear liquid was poured over the eggs, which had previously been placed in a crock or tub Only the clear liquid was used.

These eggs were well preserved; but those from the bottom of the tub had a decidedly lime taste, and the yolk in them was somewhat hardened.

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Method No. 6.—Common air-slacked lime was used. The eggs were placed small end downwards; and no eggs were allowed to touch the adjoining ones. These eggs were all bad.

Method No. 7.—Common salt was used for this lot in the same manner as the air-slacked lime.. Some of these eggs were spoiled, and all were at least one-third evaporated.

Financial Matters.

While it is the aim of the department to produce as large a revenue as possible, yet it must not be forgotten that our main work is to solve problems which the ordinary poultryman has not time nor means to solve, and to instruct students as best we can along the lines of practical poultry keeping. These take much time and money and, unless the above mentioned work be neglected it will be impossible for us to make a creditable financial showing. The instruction to students requires the keeping of many fowls that are not so profitable as others.

The shortage in the estimated revenue of this year can be largely accounted for by the fact that we have in stock nearly three times the usual number of fowls kept at this season of the year. These were not disposed of, for the reason that many were wanted for further experiments in fattening chickens, and it would not be good policy to put a large number of birds on the Christmas market when there was little or no sale for chickens; and many of those being held over are pure bred, and will no doubt be wanted for breeding purposes by farmers and others It was thought unwise to place these birds on the dressed poultry market, when the country generally is in need of good, cheap breeding stock.

To give an idea of the stock on hand now as compared with that on hand at this time last year, the following list is given:—

Variety.	1899.			1900.		
	Cocks.	Hens.	Value	Cocks.	Hens.	Value.
			$ c			$ c.
Barred Plymouth Rocks	3	36	38 00	56	100	135 00
White Plymouth Rocks	1	9	10 00	2	12	14 00
Buff Plymouth Rocks	1	6	7 00	1	9	10 00
Silver-Laced Wyandottes	1	9	10 00	3	18	20 00
White Wyandottes	4	9	12 00	6	15	19 00
Langshans	1	6	7 00	1	6	7 00
Black Minorcas	1	10	11 00	8	18	22 00
Brown Leghorns	2	10	12 00	7	11	15 00
White Leghorns	1	9	10 00	7	14	18 00
Andalusians	2	8	10 00	9	22	27 00
Light Brahmas	2	10	12 00	5	22	26 00
Dorkings	1	3	4 00	2	6	8 00
Houdans	1	3	4 00	1	3	4 00
Orpingtons	....	....	...	1	2	3 00
Grades	....	76	30 40	150	128	111 20
Ducks:	Drakes	Ducks		Drakes	Ducks	
Pekin	2	8	10 00	3	7	10 00
Cayuga	....	....	....	1	5	6 00
Rouen	....	....	....	1	2	3 00
Indian Runner	....	....	....	1	1	2 00
Grade	....	3	1 50	....	3	1 50
Total.	23	215	$188 90	265	410	$471 70

My many thanks are due to the heads of the other departments, who have rendered kindly assistance in many ways.

Respectfully submitted,

W. R. GRAHAM,

Manager of Poultry Department.

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PART XIII.

REPORT OF THE LECTURER ON APICULTURE.

To the President of the Ontario Agricultural College:

SIR,—I have the honor of submitting herewith my report of the Apiarian Department for the year 1900.

The class-room work was much the same as that of last year, but, in addition, practical demonstrations in handling bees were given on the lawn during September and October. To the first year I delivered a course of eighteen lectures, considering the physiology of the bee, brood rearing, spring management, the taking of comb and extracted honey, swarming, wintering, diseases of bees, queen rearing, and the construction of supplies; and judging from replies to examination questions, I infer that the students received accurate impressions of this subject, even of that portion of it which presents so many difficulties to beginners—I mean the taking of comb honey.

By means of a colony of bees on the lawn, practical instruction was given, during afternoons, in spreading brood and handling bees.

THE UTILIZATION OF PARTIALLY FILLED SECTIONS.

What to do with unfinished sections is one of the serious difficulties among comb-honey producers. Some keep them over until the following season and use them for "bait sections"; but only a limited number can be used in this way. Others use them by leaving the sections on the hives and feeding extracted honey to give the colonies material with which to finish them; but there are two objections to this:—first, the danger of spreading foul brood throughout an apiary; and secondly, the sections are generally travel-stained when large quantities of honey are fed.

An experiment was tried this year which so far as one year's experience goes, was entirely successful. A portion of the supers containing unfinished sections was left upon some of the hives and the remaining supers with unfinished sections were placed in front of those hives, their contents going to fill the sections upon the hives. The supers in front of the hives were provided with covers and bottom boards, and connected with their hives after the manner of the Boardman feeder. The super, of course, was not allowed to obstruct the whole entrance to the hive, but was placed a little to one side so that the bees were allowed egress from their hive. As a result there was no robbing and the feeding was done so cleanly that the sections were comparatively free from travel stains.

SPRING PROTECTION FOR COLONIES WINTERED IN CELLARS.

When a colony is wintered outdoors in a clamp or double-walled hive it will probably come through the winter with a much smaller cluster of bees than if it had been wintered in the cellar. But, on account of the greater protection afforded by a double-walled hive in spring, the queen soon makes up the disparity by laying more eggs than she would have laid had the colony been wintered in the cellar and placed upon its summer stand in the spring.

If a colony, after being wintered in a cellar, were to be placed in a clamp in the spring the queen, on account of the additional protection and the greater strength of the colony, would double or treble the amount of brood laid under ordinary conditions. But no one would care to go to the expense and labor of giving an apiary such protection in addition to wintering in a cellar.

This protection may, however, be afforded in a measure by placing supers upon the hives and putting in them chaff cushions. This was done last year upon a certain number of colonies, some of them being very weak; and, in the case of a strong colony, the cushion was found to be warmed throughout; and when a thermometer was placed between the quilt and cushion, it generally registered over eighty degrees. At night the cushion held the heat and, of course, the cluster did not contract, and the queen was enabled to lay over greater areas of comb.

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On the whole, we may say that the experiment was very successful.

This last spring (1900) was very backward for bees. Pollen was not brought in until the last of April, while the season before, it was carried in on the 25th of March. Besides this, colonies were very weak last spring, and there was much spring dwindling. But, for all this, colonies as above treated built up very quickly, and, to my great surprise, commenced to swarm on May 15th. They were stronger at that time than they were the year before, and much stronger than the unprotected colonies. Room was, of course, given, and the swarming impulse broken up.

While the early stimulation of brood rearing is not advocated by most bee-keepers, it is a good plan in fruit growing districts, where, in favorable weather, good comb honey can be procured from fruit bloom, although such honey is too dark for extract.

Introducing Queen Cells.

When wedges are used to enlarge the entrance to a hive, queen cells may be introduced by shoving three or four cells along the bottom board well into the hive; the bees will then cover them and keep them warm. When the queens hatch, the bees select one and allow her to go up on the combs above, and the other young queens are forced out of the hive. This plan did not originate with me, but it is new and requires testing. I have used it for three years, and have not yet had a swarm issue from this cause. A number of young queens hatching out would, in most other cases, cause swarming. It is safer than the old way of inserting between the combs only one cell which may be injured; and it entails no labor at all.

Respectfully submitted,

H. R. ROWSOM,

Apiarist.

PART XIV.

REPORT OF PHYSICIAN.

To the President of the Ontario Agricultural College:

Sir:—In compliance with your request in a recent communication, I present to you my report for the year now ending.

It is unnecessary for me to make any reference to the last two years as a "growing time" in the attendance at the college and in the physician's duties there.

During the months of January, February and March influenza was prevalent amongst the students, and very many of them were ill with the disease. Tonsillitis and bronchitis were of frequent occurrence. Acute lobar pneumonia occurred once. The patient entered the General Hospital in this city, where he remained under my care for several weeks before he felt able to go home.

In March and April measles was epidemic in this locality and amongst the students there were twenty-three cases. To attend to these you were obliged to employ a nurse for several weeks.

Since the beginning of the present term, though we have had many cases of the kinds usually occurring here, the general health of the College has been good. One student was taken ill with acute rheumatism and entered the General Hospital here on November 17th, where I continued to attend him till his discharge on December 22nd.

In my last report I referred to the condition of the swimming bath, and hoped some necessary improvements might be made there before the opening of the present term. As the surroundings of the bath are still as they were then, I beg to bring the matter to your notice again.

Respectfully yours,

W. O. STEWART,

College Physician.

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TWENTY-SECOND

ANNUAL REPORT

OF THE

Agricultural and Experimental Union

1900.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
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AGRICULTURAL AND EXPERIMENTAL UNION.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—

I have the honor to present herewith the Twenty-Second Annual Report, of the Ontario Agricultural and Experimental Union.

Respectfully submitted,

C. A. ZAVITZ,

Secretary.

GUELPH, CANADA, December, 31st, 1900.

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ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION.

1900-1901.

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Dick, G	Hensall.

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Harris, C. H	Rockwood.
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Loughrin, Samuel	Stratford.

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LIST OF MEMBERS, 1900-1901.—*Continued.*

Name.	P. O. Address.
Lehman, R. A	Orillia.
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McKay, A. J	Ailsa Craig.
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Williams, W. E	Clandeboye.
Webster, F. E	Creemore.
Wiancko, T. A	Sparrow Lake.
Widdowfield, J. W	Siloam.
Wilson, N. F	Rockland.
Warnica, A	Craigvale.
Wait, G. W	St. George.
Wells, Edwin A	Chilliwack, B.C.
Woolverton, C. E	Grimsby.
Wallace, H	Hamilton.
Whiteside, A. E	O. A. C., Guelph.
Weir, J	Dundas.
Waters, B. J	Ivan.
Williams, R. H	Corbetton.
Weekes, H. M	Glencoe.
Wilson, J	Whitechurch.
Westgate, H. P	Watford.
Yarwood, E. B	Picton.
Yerex, W. L	Picton.
Zavitz, Howard V	Coldstream.
Zavitz, C. A	O. A. C., Guelph.
Zavitz, C. J	Fork's Road.

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THE AGRICULTURAL AND EXPERIMENTAL UNION.

ANNUAL MEETING.

The twenty-second annual meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College, Guelph, on Monday and Tuesday, December 10th and 11th, 1900.

The President of the Union, Mr. H. R. Ross, B.S.A., presided over the three day sessions; the President of the College, Dr. Jas. Mills, was chairman at the ladies' session and at one of the evening meetings; and the Provincial Minister of Agriculture, Hon. John Dryden, occupied the chair at the public meeting held in the Convocation Hall.

SECRETARY'S REPORT.

By C. A. Zavitz, B.S.A., Agricultural College, Guelph, Ont.

The transactions of the annual meeting of the Experimental Union for 1899 were sent to the Ontario Department of Agriculture in January of the present year. This material was printed in Toronto, and filled a volume of seventy-nine pages. About 40,000 copies of the report were printed, thus bringing the results of the experimental work very prominently before the farmers of Ontario.

Two meetings of the Board of Control have been held since the last annual meeting of the Experimental Union, one in December, 1899, and one in September, 1900.

At our last annual meeting, committees were appointed to conduct co-operative experimental work in Agriculture, Horticulture, Dairy Husbandry, Economic Botany, Economic Entomology, Soil Physics, and in Poultry Keeping. All of the committees except the one on Dairy Husbandry, have carried on co-operative experimental work and have reports to present at this meeting.

The register of the ex-students has been greatly improved during the year. Within the year, we have ascertained the present addresses and occupations of upwards of three hundred ex-students, and find that there are still about three hundred and fifty of those who have attended the College since its establishment in 1874, whose present addresses and occupations we have not secured. We hope, however, to have a fair proportion of these traced up in the near future. The Register of the ex-students for the twenty-five years—1874 to 1898 inclusive—is therefore becoming one of much interest and of great value.

TREASURER'S REPORT, 1900.

By Prof. H. L. Hutt, Agricultural College, Guelph, Ont.

Receipts.

Balance from 1899	$ 235 21	Government grant	1200 00
Donation from C. F. H. Major	24 35		
Sale of weed seeds	11 50		$1602 56
Membership fees	131 50		

Expenditures.

Agricultural experiments	$ 909 61	Meeting of Executive	17 65
Horticultural experiments	215 00	Salary of Editor and Secretary	105 00
Soil physics experiments	54 15		
Botanical experiments	37 60		1547 26
Poultry experiments	22 50	Balance on hand	55 30
Apicultural experiments	6 00		
Part expenses annual meeting, 1899	105 25		$1602 56
Part expenses annual meeting, 1900	74 50		

We, the undersigned auditors, beg leave to say that we have examined the accounts of the treasurer, and find them correct, Dec. 10th, 1900.

R. HARCOURT,
G. A. PUTNAM.

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PRESIDENT'S ADDRESS.

By H. R. Ross, B. S. A., Gilead, Ont.

Gentlemen,—It is with pleasure that all are welcomed to this, the twenty-second session of our Union. We have met on common ground as practical investigators, and we may anticipate keen interest and earnest discussions at every stage of the meeting. Ex-students will have the results of hard experience; Institute workers will have gathered from even broader fields; members of the faculty will give the opinion of careful research; students will have their own ideas, and the fusion of all cannot but result in good. Our year has been a good one with progressive men. The day of the all-round man, in agriculture as in business, is passing rapidly. Only he who can adjust himself to the conditions which confront him, and can grasp the situation with the different phases of the problem clearly understood, can work to advantage. This does not mean that only one distinct course lies before all, but rather that there is a particular field for each which offers him the best opportunity. The fact that so many fail to-day is largely due to their having wrongly developed their openings in farming pursuits. The farmer's future is certainly auspicious. We hear less and less of hard times, and there are, throughout our Province, abundant evidences of a confidence in the stability and worth of the profession of agriculture, which I regret to say does not exist in all parts of the Dominion. This revival is mainly due to the fact that we have found the key to actual success in the keeping of more good stock on our farms, and the maintenance of a better balance in our income from and returns to the soil we till. The general practice to-day is a safer one than was pursued during the times of dollar barley and wheat, and is in no danger of being over-done or of proving too exhaustive to the soil. The measure of support which we are receiving from the authorites in the matter of transportation and cold storage is fully appreciated, and we may with good cause look hopefully into the future, both immediate and distant.

One matter which is serious in its aspect for the farmers, particularly in some of the Southern counties of Ontario is the increasing damage done by the pea weevil (Bruchus pisi). This insect which has practically made pea growing impossible in southern localities, seems to demand special preventive treatment. The use of chemicals such as carbon bisulphide during winter has been generally advertised, but the experience has been none too favourable, and Prof. Lochhead in his last report (page 33) very properly points out the futility of hoping to stamp out the pest by fumigation when the cold of winter renders the insects torpid. I have been in sections where the local institutes have endeavored to pass a memorial asking the Legislature to grant powers whereby townships may prohibit the growing of peas for two years at least. This is arbitrary and unpopular, and can after all only be partially effective. The search for a marketable bug-proof variety will be discussed in the report of the committee on agriculture, but it has been suggested, and it certainly appears feasible, that we have a law requiring all peas to be threshed and treated with hydrocyanic acid gas or some other recommended drug before Sept. 1st of each year. It certainly would be a powerful check, and would render possible our continuance in profitable pea growing. This matter, I learn, lies within the powers of our Local Legislature and it may be that at a later stage of our meeting you will be asked to support a memorial to them asking that action be taken.

The work of this Union continues to expand. The steady increase in the membership combined with that in the number of experimenters is a feature to be noted, likewise the fact that the percentage of successful results is also encouraging. The new branches of the work are being energetically developed, and valuable data thereby obtained. Special mention might be made of the work in botany which now includes a distinctly educational feature in the offerings of mounted weed specimens to public schools, and that in egg preservatives which will serve to illustrate the possibilities of expansion in this decidedly profitable poultry business. Moving considerably amongst farmers in all parts of the Province, I have frequently met men whose remarks showed a close study and clear grasp of the facts deduced by the work of our Union. As was happily said by one of the speakers at last year's meeting, we may justly claim to have passed the "experimental" stage in this co-operative work. The possibilities for development along the lines already

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being worked are certainly great, and we may advisedly consider the adoption of further work, provided we obtain an increase of our grant.

The reduction of our forest areas is becoming a source of menace to our farmers The periodic and protracted drouths are not to be lightly regarded. The question of fuel supply by no means ends the matter. By applied forestry in its truest sense a great deal could doubtless be accomplished in husbanding our present supply, but there are areas of varying size on every farm which could advantageously be employed in providing for the wood lot of the future. These areas, along with the wind breaks and shelter belts, would materially reduce the risks from destructive winds and excessive drouths. This at once raises the question of what trees to set for this purpose, and what varieties make the quickest, hardiest, or densest growth, or are best adapted to low or high lands, or whether native or imported trees are best calculated to serve our ends? Obviously, we are without accurate or specific data. This matter of forestry is bound to become a problem in this Province just as that of seed selection has done. This Union, by its co-operative tests, made the seed problem easy of solution by beginning in time and making good use of its results. The same has been and is being done in other lines. May we not make forestry our next step in this work of investigation.

There are other matters which we could undertake but not to so great advantage, because the stations can more readily do the work. This applies particularly to live stock experiments. I do not see how forestry can be more readily studied than through the medium of this Union. As before stated the assumption of this work is not advised except with the approval of those who have our funds in charge, and consequently no scheme is now outlined. Any thoughts as to methods, will, however, be welcomed.

Work on the Ex-student's Register is progressing favourably but slowly. When once completed it will be a most valuable compilation, and it is to be regretted that it was not sooner undertaken. We are in receipt of a donation of five pounds sterling from C. H. F. Major, of Croydon, Eng., for the ex-student's work in the Union, the first endowment of its kind that we have had. We trust that Mr. Major's liberality will be fully appreciated.

Last spring it was decided by the executive that in view of the increased and increasing work of our secretary and editor, the salary could be placed at $200 per year. This comes as a substantial recognition of good services cheerfully rendered, and your approval of the board's action is hoped for by those concerned. We hold the name of being the most economically administered organization receiving Government aid and we should endeavor to maintain that reputation as nearly as is compatible with fair treatment and good service.

Ex-students have always held a high reputation the world over in all lines of work. The past year has seen a new venture on their part, and with glorious results though saddened by loss. We have watched with intense interest the movements of our volunteers in South Africa, and the manner in which our representatives have acquitted themselves is beyond all praise of mine. Their early return is now looked for, and we may expect them to turn to their former pursuits with as little of affectation as has been the case when, on the mimic fields of our annual camps, the old 16th had borne away the Governor General's cup. One there is who will not return. When Private Findlay, the first of his regiment to fall, stained the veldt with his heart's blood, the true mettle of the man was realized, and the awfulness of war made plain. Sweet and glorious though it may be to die for one's country, we cannot fail to mark his absence and to sympathize with his stricken parents. It certainly is fitting that we should in some way mark this first tribute of this college to the Empire's cause, and the erection of a tablet in our halls in honor of his memory has been suggested. As ex-students, we should be quick to act in this matter, and the arrangements can well be left to a committee appointed to act in our behalf.

With sorrow I mention the recent loss of one of our staunchest friends in the death of the late Chairman of the College Advisory Board. The memory of John I. Hobson's record is an incentive to younger men and a proof of the possibilities of worth in this young country. Personally I feel honored in having known him, and more than once have I heard him, as he always did, declare in ringing tones his abiding faith in the science of agriculture as taught in this College. It is indeed fitting that he lived to see his belief generally accepted.

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Our college has in attendance more students than ever before, and we may with pleasure and profit once more ramble through the halls made dear by recollections of former occasions. We note with pleasure the presence of the Farmers' Institute staff, and welcome them to our annual meeting. The report of the various committees will be presented in order, and we trust much good will result.

Mr. T. G. RAYNOR: I think we should not pass by this splendid statement in connection with our Experimental Union without expressing to some extent our appreciation, and I believe there are some points in connection with it worthy of our serious consideration. One or two matters he referred to I would like to mention. He spoke of the pea weevil. As I come from one of the sections referred to, where peas are a specialty, I can say on my own behalf as well as that of others who are trying to grow this valuable crop and are interfered with by this pest, that the remarks in the address are highly appreciated and any good solution of the problem would be hailed by all our farmers very heartily. Another matter the President has touched upon that I think is worthy of our serious consideration in this Province, is the question of tree planting—the setting out of shelter belts. The visitation of these cyclones from Texas, and other places where these winds originate, work serious destruction in many parts of the Dominion, and we have felt it seriously in this Province of Ontario. The indiscriminate clearing of our land makes us more and more a prey to these winds, and I heartily endorse the ideas advanced by the President.

REPORT OF THE CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

BY C. A. ZAVITZ, B.S.A. AGRICULTURAL COLLEGE, GUELPH, ONT.

Although the Ontario Agricultural and Experimental Union was started in 1880 there appears to have been no definite system of experimental work until 1884, when Dr. Hare arranged a plan of action and nine or ten ex-students volunteered to assist in conducting experiments. By the end of 1885 not many results of the co-operative experiments had yet been obtained, as only three complete reports of one year's work had been received from the time the Union had been started, six years previous. The annual meetings, however, had been interesting and profitable, and the foundation was being laid for future work. In the spring of 1886 a new committee was appointed, and co-operative experimental work was started in real earnest. In the following summer fifteen experimenters conducted uniform tests in agriculture on their own farms, and eight good reports were secured as the result. From that time onward the development of the co-operative work in agriculture has been of a very substantial character, and we are pleased to notice that the results are now received with eagerness by the best farmers in the Province.

On behalf of the committee on agricultural experiments, I am glad to be able to say that our co-operative work has again been successful. There were no less than 3,354 ex-students of the College and other farmers throughout Ontario who conducted the agricultural experiments during the past year. While the popular subjects of the present time appear to be "Bacon Hogs," "Cold Storage," and "Poultry Fattening," still we are pleased to say that the interest in the field experiments seems to be increasing from year to year. Why should not this be the case? Our co-operative experiments in agriculture deal in a practical way with the different classes of crops which are grown each year on about ten million acres of land in Ontario.

The number of distinct experiments in agriculture conducted in 1900 was 31, being 8 more than in 1899, 12 more than in 1898, 13 more than in 1897, 15 more than in 1896, and 16 more than in 1895. These co-operative experiments now extended into every county and district of Ontario, and we might almost say into every township and even into every neighborhood of the Province. The following circular was sent out in the spring of the present year, and gives the list of experiments as well as other information regarding the work.

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DEAR SIR,—The members of the Ontario Agricultural and Experimental Union are pleased to state that for 1900 they are again prepared to distribute into every Township of Ontario material for experiments with fertilizers, fodder crops, roots, grains, grasses and clovers. Upwards of 1,000 varieties of farm crops have been tested in the Experimental Department of the Ontario Agricultural College, Guelph, for at least five years in succession. These consist of nearly all the Canadian sorts and several hundred new varieties, some of which have done exceedingly well in the carefully conducted experiments of the College, and are now being used for co-operative experiments throughout Ontario.

This system of co-operative experimental work in agriculture was started in 1886 with 60 plots, which were situated on twelve different farms in Ontario. Since that date, however, the work has increased from year to year, and in 1899 there were 12,035 plots, which were situated on 3,485 farms throughout Ontario.

Each person in Ontario who wishes to join in the work may choose any one of the experiments for 1900, fill out the accompanying form of application, and return the same to the Director of the Co-operative Experiments in Agriculture at as early a date as possible. The material will be furnished in the order in which the applications are received until the supply is exhausted. A sheet containing the instructions for conducting the chosen experiment, and the blank form on which to report the results of the work, will be sent to each experimenter at the time the fertilizers or seeds are forwarded. All material will be furnished entirely free of charge to each applicant, and the produce of the plots will, of course, become the property of the person who conducts the experiment. In return, the Committee desires to ask that each experimenter will sow all the plots belonging to the particular experiment which he has chosen for 1900, and that he will be very careful and accurate in his work and forward to the Director a complete report of the results obtained from the test, as soon as possible after the plots are harvested.

All fertilizers and seeds will be sent in good time for spring seeding, providing the applications are received at an early date. The supply of material being limited, those who apply first will be surest of obtaining the desired outfit. It might be well for each applicant to make a second choice for fear the first could not be granted. The experiment selected should be indicated by using its number as given in the left hand column in the list of experiments. Further information is given on the application form which is enclosed.

LIST OF EXPERIMENTS FOR 1900.

Grain Crops.

NUMBERS.	PLOTS.
1—Testing three varieties of Oats	3
2—Testing three varieties of six-rowed Barley	3
3—Testing two varieties of Hulless Barley	2
4—Testing three varieties of Spring Wheat	3
5—Testing three varieties of Buckwheat	3
6—Testing three varieties of Field Peas	3
7—Testing two varieties of bug-proof Field Peas	2
8—Testing three varieties of Soy or Japanese Beans	3
9—Testing three varieties of Husking Corn	3
31—Testing three varieties of Winter Wheat	3

Root Crops.

10—Testing three varieties of Mangels	3
11—Testing two varieties of Sugar Beets for stock feeding	2
12—Testing three varieties of Swedish Turnips	3
13—Testing two varieties of Fall Turnips	2
14—Testing three varieties of Carrots	3

Forage, Fodder, Silage, and Hay Crop.

15—Testing three varieties of fodder or silage Corn	3
16—Testing three varieties of Millet	3
17—Testing three combinations of Grain for fodder	3
18—Testing Grass Peas and two varieties of vetches	3
19—Testing Dwarf Essex Rape and two varieties of Kale	3
20—Testing three varieties of Clover	3
21—Testing Sainfoin, Lucerne, Mammoth Red Clover	3
22—Testing five varieties of Grasses	5

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LIST OF EXPERIMENTS FOR 1900.—*Continued.*

Culinary Crops.

23—Testing three varieties of Field Beans 3
24—Testing three varieties of Sweet Corn 3

Fertilizer Experiments.

25—Testing four fertilizers and no fertilizer with Corn 5
26—Testing four fertilizers and no fertilizer with Mangels 5

Miscellaneous Experiments.

27—Sowing Peas at four different dates to determine the injury done by the pea bug 4
28—Planting Potatoes the same day and five days after being cut 2
29—Planting Cut Potatoes which have and which have not been coated over with land plaster 2
30—Planting Corn in rows and in squares 2

The size of each plot in each of the first twenty-six experiments is to be exactly two rods long by one rod wide, and in each of the remaining experiments exactly one rod square, except in experiment No. 30, when each plot is to be exactly four rods square (1-10th of an acre).

SOME OF THE ADVANTAGES OF THESE CO-OPERATIVE EXPERIMENTS.

Farmers who conduct these co-operative experiments in their own fields with varieties of farm crops, methods of cultivation, ways of increasing soil fertility, etc., obtain valuable information which they cannot possibly get in any other way.

The Union furnishes a good method by which farmers can secure pure seed of the best varieties of grain, root, fodder, silage, and hay crops to test on their own soils, and thus find out in a very practical way which special kinds are best suited to their own particular farms.

Experimental work encourages careful handling, close observation, accurate calculation, and economical methods.

Experimenters get a start in pure seed of the best varieties of grain crops which rapidly increases in quantity, thus furnishing seed for sowing on large areas and for selling at good prices.

The co-operative experiments located on over three thousand Ontario farms form object lessons for the farmers in their respective neighborhoods.

Farmers are frequently enabled to purchase pure seed of leading varieties of grain from their neighbors who are successful experimenters.

Summary results and important conclusions from successfully conducted co-operative experiments are printed annually in the report of the Experimental Union, which is distributed in large numbers from the Department of Agriculture, Toronto, Ontario.

Important features of the experiments are frequently discussed in the field, at the fireside, and in the meetings of farmers' institutes.

Results of experiments conducted by other farmers and by the Experiment Stations are read and studied with increased interest.

Properly conducted experimental work adds pleasure to farm life and forms a very wholesome influence in keeping the boys on the farm.

The whole system leads to a substantial increase in farm profits, and to a steady advance in agricultural education throughout Ontario.

The following application form for material for experimental purposes was sent with each circular:

CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

If you wish to conduct one of the thirty agricultural experiments named on the accompanying circular, kindly fill out this blank form and return it as soon as possible.

The distribution will be confined to the choice varieties included in the various experiments. In filling out the blank form, therefore, it is neither necessary nor advisable to mention any particular variety or varieties.

Material for either number 25 experiment or number 26 experiment will be sent by express, and for each of the others it will be forwarded by mail.

Address all communications to

C. A. ZAVITZ,
Agricultural College, Guelph, Ont.

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Application for Material for an Experiment.

I would like to conduct experiment number.........., but if all the material for that experiment has been applied for before my application is received I select experiment number .... as my second choice. If the material for one of these two experiments is forwarded to me I will endeavor to

1. Carry on the test according to instructions received with the seed,
2. Exercise care and accuracy in the work, and
3. Report the results of the experiment as soon as possible after harvest whether successful or not.

Name..
Post Office..
Express Office..
Line of Railway...
County..
Date of mailing..

The co-operative work is done entirely through correspondence. The instructions for the various experiments which are sent out to the experimenters have been improved from year to year until they have become clear, concise, and efficient for the work. As there are thirty-one distinct experiments, each of which requires instructions peculiar to itself, the reader will understand the large amount of work there is in furnishing instructions for this system of co-operative experimental work in agriculture.

No varieties were sent out except those which had done exceptionally well in the trial plots in the experimental department. As the reports are received from the various experimenters they are examined very carefully and all those which show any signs of inaccuracy in any way whatever are discarded. Every experimenter who did not conduct the experiment with the full amount of material; who did not use plots uniform in size and according to instructions; who did not give the exact yield, etc., produced on the different plots, will not find his name in the following list as being one of those whose reports were included in the summaries which will be given here. For the summary report nothing but the results which were obtained from carefully conducted experiments have been used. While these summaries should be of great value to the farmers generally, still those who conducted the experiments have obtained much additional information regarding the results of their experiments as adapted to their individual circumstances which it is impossible to convey in a concise report of this kind.

The experimenters deserve much credit in successfully conducting the various experiments during the past season, and the farmers of Ontario owe much to these experimenters for the valuable reports which they have furnished, and which are here presented in a concise form. I am pleased to state that we have a larger number of good reports of successfully conducted experiments this year than on any previous occasion.

The reader is referred to the annual reports of the Agricultural College for the descriptions of the varieties and for the results of experiments conducted with these varieties in the experimental department at the College.

Reports of Experiments.

The following are the average results of the co-operative experiments successfully conducted over Ontario in 1900:

Grain Crops.

Each experimenter was asked to give the relative value of each variety as the result of the experiment conducted on his own farm. These reports were summarized and the comparative value of the varieties, as determined from the average results, are presented in the above table.

The yield of straw as here reported means the total crop less the amount of grain, and this would, of course, include the chaff or the husks with the straw or the stalks.

The yields of grain are given in number of bushels per acre by weight, and not by measure. The weights per measured bushel used in this determination are as follows:

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Oats 34 lbs.; six-rowed barley 48 lbs.; hulless barley 60 lbs.; spring wheat 60 lbs. buckwheat 56 lbs.; peas 60 lbs.; beans 60 lbs; corn 56 lbs; and winter wheat 60 lbs.

Experiment.	Varieties.	Comparative value.	Yield per acre. Straw (tons).	Yield per acre. Grain (bush.)
1. Oats, 97 tests	Siberian	100	1.4	53.4
	Joanette	74	1.4	50.8
	Daubeney	56	1.2	45.6
2. Six-rowed barley, 26 tests	Oderdrucker	100	1.0	37.1
	Mandscheuri	100	1.0	35.3
	Success	53	.8	28.7
3. Hulless barley, 68 tests	Black Hulless	100	1.1	20.2
	White Hulless (bearded)	86	1.2	18.1
	White Hulless (bald)	85	1.1	18.0
4. Spring wheat, 21 tests	Wild Goose	74	1.2	20.5
	Wellman Fife	100	1.3	20.0
	Herison Bearded	69	1.2	18.9
5. Buckwheat, 6 tests	Silver Hull	100	2.3	14.6
	Common Grey	80	2.3	14.0
	Japanese	60	1.9	13.5
6. Peas, 50 tests	Early Britain	100	1.0	25.0
	Prussian Blue	98	1.2	24.8
	Golden Vine	86	1.1	23.6
7. Peas, 99 tests	Grass	100	1.3	22.7
	Oddfellow	76	1.3	19.5
8. Soja, or Japanese beans, 9 tests	Medium Green	89	1.9	26.9
	American Coffee Berry	100	1.1	23.3
	Extra Early Dwarf	63	.7	15.0
			Whole crop.	
9. Corn for grain, 16 tests	North Star Yellow Dent	100	10.4	59.9
	Salzer's North Dakota	73	11.6	49.2
	Compton's Early	73	9.7	48.5
			Straw.	
31. Winter wheat, 114 tests	Dawson's Golden Chaff	100	1.8	30.1
	Gold Coin	73	1.8	28.1
	Early Genesee Giant	84	1.7	27.2
	Early Red Clawson	69	1.6	26.8
	Diamond Grit	71	1.8	25.9

Oats.—The Siberian variety of oats occupied first place in yield of grain per acre in the average results of 125 experiments in 1892, 105 experiments in 1893, 121 experiments in 1894, 78 experiments in 1895, 106 experiments in 1898, 107 experiments in 1899, and 97 experiments in 1900; and it occupied second place in yield of grain per acre in 1896 and in 1897. It will, therefore, be seen that the Siberian oats have made an excellent record, not only in the experiments at the Agricultural College but also in the tests made throughout Ontario. In 1900, each experimenter was asked to sow an extra plot with the variety of oats which had proven the best in his past experience. In all, 16 experimenters used the American Banner oats for the extra plot, and reported the yields of the Banner along with the results of the experiment. We find from these reports that in eleven of the experiments the Siberian gave the larger yield of grain; in four of the experiments the Banner gave the larger yield of grain; and in one experiment the two varieties gave equal results. It will, therefore, be seen that the Siberian has not only given a larger yield of grain per acre than that produced by the American Banner at the Agricultural College, but it has also given a larger yield in the co-operative experiments over Ontario.

Six-Rowed Barley.—The Mandscheuri barley gave the largest average yield of grain per acre in the comparative tests over Ontario in each of the years 1892, 1893, 1894, 1895, 1896, 1897 and 1898; and the second largest average yield of grain per acre in 1899 and in 1900. The Oderbrucker barley has given the second largest average yield of

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grain per acre in the comparative tests over Ontario in each of the years 1892, 1893, 1894, 1895, 1896, 1897 and 1898; and the largest average yield of grain per acre in 1899 and in 1900. It, therefore, appears that while the Mandscheuri has given the best average results both at the College and over Ontario for a number of years, still the Oderbrucker seems to be gaining somewhat on the Mandscheuri in the yield of grain. The Success variety gave a less yield per acre than the Oderbrucker of 7.3 bushels per acre in 1899, and of 8.4 bushels per acre in 1900.

Hulless Barley.—Previous to 1900, no distinct experiment was conducted with Hulless barley, but one variety of Hulless barley was included with the Six-rowed varieties for the barley experiment. In 1899, the Black Hulless barley gave a less yield per acre than either of the three Six-rowed barleys tested over Ontario. In the results for 1900, it will be seen that the Black Hulless gave the largest yield of grain per acre of the three varieties of Hulless barley under experiment, and that this was the most popular variety with the experimenters. The White Hulless (Beardless) barley has been *advertised* very extensively within the past few years.

Spring Wheat.—The Wild Goose variety, which has given the largest yield of grain per acre among all the varieties grown at the Agricultural College, has also produced the largest yield of grain per acre in the average of twenty-one experiments conducted over Ontario in 1900. It will be seen, however, that the Wellman Fife variety was the most popular among the experimenters. As these experiments were conducted pretty generally over the Province, the experimenters perhaps remembered the low prices which were formerly paid for the Wild Goose spring wheat as a flour producer. As the demand for this variety for export to France and Italy for the manufacture of macaroni has kept the price of the Wild Goose variety of spring wheat about equal with that of the finer quality varieties during the greater part of the time within the past few years, the Wild Goose wheat is now being grown quite extensively in some localities. For the manufacture of flour in Ontario, however, the Wellman Fife variety would likely give better general satisfaction. The Herison Bearded spring wheat usually weighs heavily per measured bushel, but this year it yielded about one bushel per acre less than the Wellman Fife.

Buckwheat.—The average yield of Buckwheat per acre in the co-operative experiments over Ontario for each of the three years previous to 1900 was as follows: 1897, 21.3 bushels; 1898, 16.5 bus.; and 1899, 22.5 bus. It will be seen from the foregoing results, that the average yield of the Buckwheat per acre for 1900 was only fourteen bushels per acre, which is a comparatively low yield. It will also be noticed that the Japanese variety came the lowest in yield per acre in 1900, but this variety has usually produced as good and sometimes better yields per acre than the Silver Hull.

Peas.—Previous to 1900, there was only one experiment with peas, but in the spring of the past year it was thought advisable to make two distinct experiments. Therefore, three of the largest yielding varieties were selected for one experiment, irrespective of their weevil (Bruchus pisi) resisting qualities, and two varieties were selected for another experiment, these having been comparatively free from the ravages of the pea weevil in the experiments at the College. As the result of placing these two experiments on the list, nearly all the experimenters who asked for the large yielding varieties were located in the Northern part of Ontario where the pea weevil does but little damage, while nearly all of those asking for the bug-proof varieties were those located in the Southern part of Ontario, where the pea weevil has been doing so much serious damage of late. The average results of the experiments show that the percentage of peas containing weevils or bugs in each variety were as follows:—Early Britain 13 per cent.; Golden Vine 8 per cent.; and Prussian Blue 7 per cent. The Oddfellow variety, which was one of the freest from the ravages of the weevil of the common varieties tested at the College, showed that it was certainly not proof against the weevil over Ontario. The Grass Pea was the only one of the five varieties sent out which was weevil proof. We have found in our own experiments at Guelph that the Grass Pea has been entirely free from the injuries of the weevil, and have reported these results from time to time, and we are pleased to know that this variety is now being grown to a considerable extent in some sections of Ontario where the weevils are very troublesome.

Soy, Soja, or Japanese Beans.—The Soy bean is a leguminous plant, native of Japan and China, and ranks very high from a chemical point of view. The plant is erect in

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growth and branches profusely. The Soy beans are used for green fodder, silage, hay, pasture and as a soil renovator. The grain is used as a food for live stock. These beans have been used for the food of man since early times in Japan, and more recently in European countries. They are not used as a food by themselves, but are made into different complex forms, of which five are quite common among the Japanese people. The Soy, or Japanese beans gave good results in the Union experiments in 1899, and again in 1900. The yield of grain per acre in 1899 was 22.4 bushels for the Medium Green, 21 3 bushels for the American Coffee Berry, and 12.7 bushels for the Extra Early Dwarf. The results for 1900 are in the same comparative order, but the yields are slightly higher than in the year previous.

Corn for Grain.—Previous to 1900 there was only one experiment with corn, but in the past year there have been three distinct experiments, one with corn for grain, another with corn for fodder or silage, and another with sweet corn for table use. In the average results of 16 tests over Ontario it will be seen that the Dent variety gave the largest yield of grain per acre, surpassing the well-known Compton's Early Flint variety by 11.4 bushels of grain per acre.

Winter Wheat.—The results of the co-operative experiments with winter wheat were sent to 350 Ontario newspapers in August, 1900, in order that the results would be known in good time for winter wheat sowing. The Dawson's Golden Chaff again headed the list in yield of grain per acre, and the Diamond Grit, which was sent out more especially on account of its good milling qualities, has given 4.3 bushels per acre less than the Dawson's Golden Chaff.

ROOT CROPS.

Experiment.	Varieties.	Comparative value.	Yield of roots per acre (tons).
10. Mangels, 13 tests	Evan's Improved Mammoth Sawlog	100	33.6
	Carter's Champion Yellow Intermediate	65	21.6
	Carter's Warden Yellow Globe	65	21.2
11. Sugar beets, 18 tests	Danish Improved	100	23.8
	White Silesian	66	23.7
12. Swedish turnips, 3 tests	Sutton's Magnum Bonum	100	21.6
	Hartley's Bronze-top	50	20 4
	Kangeroo	50	17.8
14. Carrots, 8 tests	Half-long White	100	24.2
	Danver's Orange	55	18.7
	Guerande	55	18.1

There were five distinct experiments with root crops in 1900, but the past season has been somewhat unfavorable for the growth of roots over a considerable part of the Province. We, therefore, find that we have a smaller number of reports of successfully conducted experiments with roots for 1900 than for some of the years previous.

Mangels—The Evans' Improved Mammoth Sawlog, which has given decidedly the largest yield of roots per acre in the co-operative experiments over Ontario, is a variety which also stands at the head of the list in yield of roots per acre among all the varieties which have been grown in the experimental department. The Carter's Champion Yellow Intermediate, however, usually approaches the first named variety much closer than is shown in the average results of the experiment here given. This variety did not do as well in 1900 as it has done in former years. In 1899 the Evans' Improved Mammoth Sawlog gave an average of 31.8 tons per acre, and the Carter's Champion Yellow Intermediate gave 30 4 tons per acre. Both the Evans' Improved Mammoth Sawlog and Carter's Champion Yellow Intermediate have usually given good results over Ontario.

Sugar Beets for Feeding Purposes.—In past years, one variety of sugar beets was included in the experiments with mangels, but it was thought advisable in 1900 to make a distinct experiment and, therefore, two varieties from among some 13 different kinds, which have been tested at the Agricultural College, were selected for the co-operative test.

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It will be seen that the Danish Improved and the White Silesian gave practically equal results in yield per acre, but the Danish Improved was the most popular variety among the experimenters. It is quite probable that this popularity is owing to the great ease with which the Danish Improved variety can be pulled from the ground, in comparison with the White Silesian variety which grows deeper in the soil and has fibrous roots.

Swedish Turnips.—The Sutton's Magnum Bonum variety was used for the co-operative experiments in 1900 for the first time, and it gave an average of a little over 1 ton per acre more than the Hartley's Bronze Top which had given the best results in the co-operative experiments of former years. It will be observed, however, that there were only three good reports of carefully conducted experiments with Swedish Turnips.

Fall Turnips.—As no good reports of satisfactorily conducted experiments of Fall Turnips were received, we have no summary results to present.

Carrots.—As in former years, the Half Long White or the Improved Short White variety has given a considerably larger yield of roots per acre than any of the other varities tested.

FORAGE, FODDER, SILAGE AND HAY CROPS.

Experiments.	Varieties.	Comparative value.	Yield of whole crop per acre, tons
15. FODDER CORN, 10 tests	Mastadon Dent	100	15.3
	Wisconsin Earliest White Dent	50	13.8
	North Star Yellow Dent	17	12.6
16. MILLET, 12 tests	Japanese Panicle	100	10.7
	Japanese Barnyard	95	10.7
	Hungarian	89	8.9
17. GRAIN MIXTURES, 8 tests	Oats, Peas and Vetches	88	9.7
	Oats and Vetches	88	8.4
	Oats and Peas	100	8.1
18. GRASS, PEAS, AND VETCHES, 9 tests	Hairy Vetches	76	8.6
	Grass Pea	100	7.9
	Common Vetch	52	7.7
19. RAPE AND KALE, 3 tests	Dwarf Essex Rape	100	13.8
	Marrow Stem Kale	92	12.8
	Thousand headed Kale	80	11.1
		Sec'd year's crop. Tons of Green Hay per acre. 6 tests.	Sec'd year's crop. Tons of Dry Hay per acre. 8 tests.
20. CLOVERS	Mammoth Red	7.3	4.2
	Common Red	6.0	2.2
	Alsike	5.6	2.7
		Appearance of varieties about 6 mos. after seeding	Av'ge height about 6 mos. after seeding (inches).
21. LEGUMES, 12 tests	Perennial Red	Good	6.6
	Lucerne	Medium to Good	6.5
	Sainfoin	Medium	5.3
		2nd season's crop. Tons of hay per acre. 6 tests	Th'd & Fo'th season's crop Tons of hay per acre. 4 tests.
22. GRASSES	Tall Oat Grass	3.0	3.1
	Timothy	2.7	1.8
	Orchard Grass	2.0	1.6
	Meadow Fescue	2.2	1.5

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There were in all eight experiments with forage, fodder, silage and hay crops, and the results here given are both interesting and valuable.

Fodder Corn.—The largest number of experimenters decided in favor of the Mastadon Dent variety of corn for silage purposes as compared with either the Wisconsin Earliest White Dent or the North Star Yellow Dent. It must be remembered, however, that this was an exceptional season for corn growing and that many varieties in certain localities this season would mature in many cases where they would not mature in an average year. The early autumn being exceptionally free allowed the Mastadon Dent, which is a large growing variety, to reach a fair stage of maturity. In average seasons, it would likely be found that the Mastadon Dent would give excellent results in the Southern part of Ontario and that the Wisconsin Earliest White Dent would be better suited for the central part of Ontario, and that the North Star Yellow Dent would be the best of the three varieties for the colder sections. The North Star Yellow Dent variety is even earlier than the Salzer's North Dakota, and fully as early as the Compton's Early.

Millet.—For three years in succession, the Japanese Panicle millet has given a larger yield of crop per acre than either of the other two varieties of millet which have been under experiment. It will also be observed that the Japanese Panicle variety was a favorite with the experimenters in each of the past three years.

Three Combinations of Grain for Fodder.—It seems rather strange that, although the oats, peas and vetches usually give a larger yield per acre than either oats and peas or oats and vetches in the co-operative experiments, still in each of the past five years the experimenters have selected the peas and oats as their favorite mixture, all things taken into consideration. I think that there are good reasons for this, however, some of which may be as follows: Farmers usually have their own peas for seed. Seed vetches usually come expensive and unless watched closely frequently contain mustard and other weed seeds. The vetches themselves, if allowed to ripen, become a nuisance as a weed in the land.

Grass Peas and Vetches.—The Hairy vetches, Common vetches and Grass peas are all leguminous crops and, therefore, like clover and peas are valuable as nitrogen gatherers. The Hairy vetches gave an average yield more than the Common vetches of 2.1 tons per acre in 1899, and by nearly 1 ton per acre in 1900. It will be seen that the Grass pea is not only proof against the weevil as is shown in other experiments, but it is also a very popular variety among experimenters for green fodder purposes.

Rape and Kale.—In our experiments both at the College and throughout Ontario there is no variety of rape or kale which we have yet tested which surpasses the Dwarf Essex for general cultivation.

Clover.—Only two reports were received this year from clover which was sown in 1899. The results given in the table are the averages of two years' results. The results of the second crop of clover are not included in the summary. It will be seen from the average yield of the first cutting, the Mammoth Red has given decidedly the largest yield of both green crop and of hay per acre.

Sainfoin, Lucerne and Mammoth Red Clover.—An additional experiment was added to the list in the spring of 1900, which included three perennial legumes. The results, of course, are of little value for the first season.

Grasses.—The results given for the different varieties of grasses are for the second, third and fourth seasons after the seed had been sown. No second crop in any one season is included in the average results here given. It will be seen that the Tall Oat Grass has given the largest yield of hay per acre throughout.

CULINARY CROPS.

Experiment.	Varieties of Beans.	Comparative value.	Yield per acre.	
			Straw (tons).	Grain (bus.)
23. Beans. 13 tests.	Medium or Navy	100	.8	21.8
	Marrowfat	81	.9	20.7
	White Wonder	76	1.3	18.5

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CULINARY CROPS.—*Continued.*

Experiment.	Varieties of Sweet Corn.	Table quality.	Comparative number of ears.	Number of days until ready for table use.
24. Sweet Corn 35 tests.	Black Mexican	100	94	92
	Kendal's Early Giant	99	100	85
	Country Gentleman	89	97	100

Two experiments were conducted in 1900 with culinary crops, and in all 48 good reports were received.

Field Beans—The average result of six experiments conducted with field beans in 1899 were as follows: Medium or Navy, 21.3 bus. per acre; Marrowfat, 20.2 bus. per acre; and White Wonder, 16.1 bus per acre. It will be seen from the results for 1900 that the order in yield per acre for the past year is exactly the same as for the year previous. The Medium or Navy gave 21.8 bus.; Marrowfat, 20.7 bus; and White Wonder, 18.5 bus. per acre. The Medium or Navy variety has given good results both at the College and throughout Ontario.

Sweet Corn—Three varieties of sweet corn were sent out in connection with our co-operative experimental work in 1900 for the first time. In order to get good comparative results, some of the very best varieties which require about the same length of time to reach the proper stage for culinary purposes, were selected. The Black Mexican has not come in general use as much as some of the other varieties owing to the black color of the ripe corn. It will be seen, however, from the above table that the Black Mexican variety of sweet corn was very highly appreciated by the experimenters, although there is not a very marked difference in the table quality of the three varieties. They are all excellent varieties for the production of green corn for table use.

FERTILIZERS WITH OATS, MANGELS, AND CORN.

Fertilizers.	Quantity per acre of Fertilizer used.	Cost per acre of Fertilizer used.	Average yield per acre. Bushels of oats per acre, 5 yrs., 74 tests.	Tons of Mangels. 1900. 9 tests.	Tons of Mangels. Average 4 years, 36 tests.	Corn per acre. Total crop (tons). 1900. 7 tests.	Corn per acre. Total crop (tons). Average 4 years, 38 tests.	Corn per acre. Ears (tons). 1900. 7 tests.	Corn per acre. Ears (tons). Average 4 years, 33 tests.
	lbs.	$	bus.	tons.	tons.	tons.	tons.	tons.	tons.
N. Fertilizers	none.	....	38 9	21 79	20.10	8 47	7.59	3 22	3.18
Nitrate of Soda	160.0	3.84	46.8	24 41	21 35	9.25	8 61	3 45	3 52
Muriate of Potash	160.0	3.81	43.8	26.89	23.47	9.55	8 68	3.40	3 61
Superphosphate	320.0	3.36	43.6	25 80	23 42	9.33	8.42	3 48	3 61
Mixed Fertilizer	213.3	3 68	48.7	24.22	23.19	9.56	8.69	3 50	3.67

NOTE.—The superphosphate and the muriate of potash were applied to the land at the time of planting, and the nitrate of soda at the time that the plants were about three inches high. The "Mixed Fertilizer" consisted of one part nitrate of soda, one part of muriate of potash and two parts of superphosphate.

Fertilizers with Mangels and Corn.—Different fertilizers were used on both mangel and corn crops in connection with the co-operative experiments of the past year. As this experiment has been conducted in somewhat similar lines for nine years in succession, we are not only presenting the results for the past year but also the average results for fertilizers used with oats for five years in succession, and with both mangels and corn for four years in succession. Besides using different fertilizer plots, each experimenter

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was asked to use an extra plot and apply good average cow manure at the rate of 20 tons per acre which would be equivalent to about ten or twelve good sized loads. This was the first year in which an extra plot was used. The extra plot which received cow manure gave the following average yields per acre: in the mangel experiment 26.2 tons; and in the corn experiment 9 9 tons of total crop and 3 6 tons of ears per acre. The experiment will likely be continued in a similar way in 1901. The results of this experiment as presented in the table here given are worthy of careful study.

Miscellaneous Experiments.

Sowing peas at four different dates to determine the injury done by the pea weevil (*Bruchus pisi*).

Experiment.	Seedings two weeks apart.	Percentage of weevilly peas in crop.	Yield per acre.	
			Straw (tons).	Grain (bush).
27. Peas. 2 tests.	1st Seeding	74	1 7	24.2
	2nd Seeding	57	1.1	20.1
	3rd Seeding	47	.7	14 2
	4th Seeding	35	.6	10.9

Planting potatoes the same day and five days after being cut.

Experiments.	Time of planting.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre (bush).
28. Potatoes. 53 tests.	Immediately after cutting	100	87	175.2
	Five days after cutting	24	85	157.5

Planting cut potatoes which have and which have not been coated over with land plaster.

Experiments.	Treatment of cut seed.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre (bush).
29. Potatoes. 59 tests.	Coated with plaster	100	92	181.6
	Not coated with plaster	63	88	165.2

Planting corn in rows and in squares.

Experiments.	Method of planting.	Comparative value.	Yield per acre.	
			Husked ears (tons).	Whole crop (tons).
30. Sweet corn. 4 tests.	In squares or hills	100	2.5	14.9
	In rows or drills	50	2.3	13.3

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Sowing Peas at Four Different Dates to determine the Injury done by the Pea Weevil (Bruchus pisi).—For two years in succession, an experiment has been conducted by sowing peas at different dates in the spring, in order to ascertain the relative amount of injury done by the pea weevil upon the crop produced from the different seedings. The first seeding took place as early as the peas could be nicely sown in the spring and two weeks were allowed to intervene between each two dates of seeding. The results for 1899 show that the first, second, third and forth seedings gave 17.9, 13.7, 11.9, and 6 2 bushels of grain per acre, and 83, 76, 67, and 46 per cent. of weevilly peas respectively. It will, therefore, be seen that the results of the past two years have been very similar for this experiment. It is true that as the date of seeding advances, the percentage of weevily peas decreases, but it is also very evident that the decrease in the yield of grain per acre is also very marked.

Planting Potatoes the Same Day and Five Days After Being Cut.—This experiment has been conducted for several years at the Agricultural College and for three years over Ontario, and the average results have been very similar in all experiments. As a rule, the potatoes which have been cut and planted on the same day give about 18 bushels per acre more than those which were cut and planted from four to six days after being cut.

Planting Cut Potatoes which have and which have not been Coated Over with Land Plaster.—Although this experiment has been conducted at the Agricultural College for five years, this is the first time that it has been entered as one of the co-operative experiments in agriculture. It was found in the College experiments that the potatoes which were cut and coated over with land plaster gave better results than those in which land plaster was not used on the cut seed. It will be seen that the results of the co-operative experiments are also 16.4 bushels per acre in favor of using the land plaster.

Planting Corn in Rows and in Squares.—An experiment has now been conducted over Ontario for two years in succession in which corn has been planted in rows 3 feet apart, and in comparison with this corn has been planted in squares or hills 3 feet apart both ways. Exactly the same amount of corn was used for each method. Flat cultivation was used throughout, and the same amount of cultivation was given to each method of seeding. The average of ten co-operative experiments in 1899 shows that the corn planted in squares gave 11.5 tons of total crop and 2.7 tons of ears per acre, and that the corn planted in rows or drills gave 10.3 tons of total crop and 2 2 tons of ears per acre. It will be seen by comparing these results with the figures given in the table for 1900, that the results for the two years are very similar, and that the corn which was planted in squares, or as it is usually termed, hills, has given the largest yield of both whole crop and of husked ears per acre.

REPORT OF CO-OPERATIVE EXPERIMENTS IN HORTICULTURE.

H. L. HUTT, B. S. A., AGRICULTURAL COLLEGE, GUELPH, ONT.

The co-operative testing of small fruits was begun in 1894, with 60 experimenters. Each year since then, the work has been steadily increasing; and we have now on our lists the names of 709 experimenters to whom various lots of plants have been sent. During the past six years we have sent out 1,620 gooseberry bushes; 1,800 currant bushes; 2,760 blackberry plants; 3,600 black raspberry plants; 3,600 red and white raspberry plants, 19,440 strawberry plants, or a total of 32,820 plants.

This number of plants of the leading varieties of small fruits distributed in small lots all over the Province must at least be helping to bring about that time when farmers all over the country will enjoy the luxury of fresh and preserved fruits upon their tables the greater part of the year. If we succeed in this, although the results may not always be reported, we shall feel that our labor has not been in vain.

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Strawberries.—In the spring of 1900, 100 lots of plants were sent out, made up of the following varieties: Clyde, Glen Mary, Haverland, and Saunders, 12 plants each. 50 reports on the growth of these have been received this fall. The majority of those reporting have a fair stand of plants, although some report failure because of the drouth in some sections. In this connection we may say that experience has shown that strawberry plants obtained from a distance seldom make as good a stand of plants as those transplanted from another patch near at hand. Hence we have advised our strawberry experimenters to take a dozen young plants from each variety sent this year and set them out in a new plantation next spring. In this way they may get a full stand of plants and continue the experiment under better conditions another year.

In the spring of 1899, 100 lots of plants were sent out, made up of Clyde, Haverland, Woolverton, and Van Deman, 12 plants each. Only 29 reports have been received upon these this year. The records of yield vary considerably, because but few experimenters succeeded last year in getting a full stand of plants. Hence, we cannot well give a definite comparison of the yields. Some report very heavy yields and others very light. The majority accord the Clyde first place, and speak of it in such terms as, "by far the best", "the Clyde for me", "the Clyde particularly fine", etc. Haverland, a reliable standard for home use, takes second place. Some experimenters report very favorably of Woolverton, because of its large handsome berries, but it does not compare with Clyde in point of yield. Van Deman does not as a rule yield so heavily as these other varieties, but it is one of the earliest to ripen, and the fruit is of a fair size and good quality. These four varieties give a long season of fruiting and make a choice collection for either home use or market.

Red Raspberries.—25 lots were sent out in the spring of 1900 made up of Marlboro, Cuthbert, Shaffer, and Golden Queen, 6 plants of each. 12 experimenters report on the growth of plants this fall, showing that most of them have succeeded in getting a fair stand of plants and frequent mention is also made of the vigorous growth of the Shaffer; in some cases it had made canes three times as long as any of the other varieties.

Fourteen experimenters report upon the fruiting of a similar lot of plants sent out in 1899. The Shaffer ranks first, giving nearly double the yield obtained from any other variety. Cuthbert comes second, and is one of the best mid-summer varieties. Golden Queen is in many respects a yellow Cuthbert, but in these co-operative tests it ranks below the Cuthbert in point of yield. In our experiments at the College this year, Golden Queen has for the first time come out ahead of all other varieties. Marlboro ranks last among the four varieties for yield, but it is the first to ripen its fruit. Hence, it is valuable because of its earliness. These four varieties cover the season well, Marlboro being the earliest, followed by Cuthbert, with Golden Queen and Shaffer for late season. They are all deserving of a place in any collection for home use or market. The Marlboro and Cuthbert are most valuable for market, because of their bright red color.

Only two reports were received upon the plants sent out in 1898, and but three upon those sent out in 1897. The results from these tend to confirm those which have just been given.

Black Raspberries.—25 lots of these were sent out in the spring of 1899, made up of the following four varieties:—Gregg, Hilborn, Palmer and Souhegan, 6 plants each. 16 experimenters report this fall upon the growth of the plants. Nearly all report that most all of the plants have lived and made a good growth.

Nine experimenters report the yields upon a similar lot sent out in 1899, and the results show the varieties to rank in the following order for productiveness:—Gregg, Palmer, Hilborn and Souhegan.

Nine experimenters report upon the plants sent out in 1898. Much heavier yields are reported upon these older bushes, and Hilborn is accorded first place, Gregg second, Souhegan third, and Palmer fourth.

Blackberries.—25 lots were sent out last spring made up of the following four varieties:—Agawam, Gainor, Kittatinny, and Snider. 15 experimenters report this fall upon the growth of the plants during the past season. Blackberries are slower to take root than most of the other small fruits; consequently there are more failures reported in this season than in any of the other experiments. The majority of the experimenters have, however, a fair stand of plants, and will be able to propagate plants from what are living to fill up spaces.

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Eight reports have been received upon plants sent out in 1899, and a summary of these show that the Taylor ranks first for yield, Gainor second, Kittatinny third, and Snyder last.

Nearly all of the Blackberry bushes sent out in 1898, and previous to that, were winter-killed during the severe winter of 1898-99.

Currants.—Twenty-five lots were distributed in the spring of 1900, made up of the following four varieties: Fay, Raby Castle, Victoria, and White Grape, 3 bushes of each. Eighteen of those who received plants reported upon their growth this fall. Sixteen of them reported all plants living and making a good growth. This is a very good record for so many planters and promises well for future reports on yields.

Thirteen reports have been received upon a similar lot sent out in 1899. Nearly all mention that the bushes are growing nicely, but that they have borne but little fruit this year. This is as much as could be expected from currant bushes only one year planted.

Nine reports have been received upon the bushes sent out in 1899. An average of the yields obtained shows that Raby Castle is ahead of the list with an average of 11 oz. per bush; Victoria and White Grape were alike with an average of 10 oz. per bush; while Fay gave 8 oz per bush. These are not big yields, but it must be remembered that this is but the first crop upon young bushes.

Eight reports have been received upon the yields from bushes sent out previous to 1898. By taking an average of the yields reported, we find that Raby Castle is still ahead with 102 oz. per bush; White Grape second, with 85 oz.; Victoria third, with 73 oz.; and Fay last, with 40 oz. per bush. In this test the experimenters have the choice between quantity and quality. Fay, although the last on the list, produces by far the largest and finest berries; while Raby Castle, which heads the list, produces the smallest berries.

In our variety tests at the College, the White Grape has yielded first place among all varieties during the past four years, but white currants do not sell in the market like the red varieties.

Gooseberries.—Twenty-five lots of plants were sent out last spring, made up of the following varieties:—Downing, Pearl, Red Jacket, and Whitesmith, 3 plants of each. Nineteen of the experimenters reported on the growth of the plants this fall, fifteen of them stating that all of the plants had lived and made a good growth. No yields could of course be expected from these this year.

In 1899, the varieties sent out were Downing, Pearl, Industry and Whitesmith. Nine reports have been received upon the yields from these this year. Whitesmith heads the list with a yield of 22 oz. per bush. This is something remarkable, as Whitesmith is usually so badly mildewed that it takes third or fourth place.

Previous to 1899, the varieties sent out were Houghton, Downing, Industry and Whitesmith. Nine experimenters report this year upon the yields from these, and an average taken, places Houghton ahead with 82 oz. per bush; Downing second, with 58 oz. per bush; Industry third, with 35 oz per bush; and Whitesmith fourth, with 30 oz. per bush. In these experiments, as with the currants, the variety giving the greatest yield bears the smallest berries, whilst the largest fruited varieties stand at the bottom of the list.

In conclusion, we may say that the greatest value of these experiments is not in the brief summary of the reports presented at this meeting. Their greatest value naturally accrues to those who conduct the experiments. In the first place, from the plants sent out many are getting a start in the growing of small fruits, who would otherwise perhaps never have given it a thought. The varieties sent out are selected as the most likely to give the best results throughout the country, and early, medium, and late ones are chosen so as to give as long a fruiting season as possible for home use. With the plants sent out for each experiment, directions are given for their care and cultivation, and for the propagation of new plants. Many are making use of the plants obtained to increase their stock; and some have now fruit plantations large enough to be able to supply their own tables and besides send fruit to the local markets.

Q. Why is the Lawton strawberry always left off the list?

Prof. Hutt: It has been superseded by other and better varieties.

Q. We do not grow anything else

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PROF. HUTT: Where do you live?

Q. In the Niagara district.

PROF. HUTT: I know the Lawton succeeds well there, but it has a rather limited section. Near Grimsby other varieties are grown.

Q. Have you ever grown the Western Triumph variety of Strawberries? It does well in northern Ontario.

PROF. HUTT: It ranks well as a hardy variety; so does the Snider. I have seen good crops of the Snider in North Simcoe.

Q. Have you tried the Prince Albert for a late variety of currants?

PROF. HUTT: We find that it is too late. Currants that ripen early will remain on the bush as long as you want to leave them.

Q. Did you try North Star variety of currants?

PROF. HUTT: It is a very heavy yielding variety, although a small berry and somewhat late. It stood head of the list two years ago at the College.

MR. SIMPSON RENNIE: Have you had any experience in making raspberry jam out of apples? There is a firm in Toronto supplying large quantities made in that way. They boil the apples thoroughly, color them, add whatever flavor they wish, and use hulled timothy seed to imitate the seed of the raspberry.

A MEMBER: It was served up there in a hotel only two or three days ago. It was an insult to a fruit grower, and one of any experience in the article could detect it at once. But they do better than that,—they take turnips and make them into jam. For coloring they use analine dyes.

REPORT OF CO-OPERATIVE EXPERIMENTS IN ECONOMIC ENTOMOLOGY.

BY PROF. W. LOCHHEAD, B.A., M.S., AGRICULTURAL COLLEGE, GUELPH, ONT.

For two years the director tried to formulate a plan of operations which could be carried on successfully by members of the Union, but without result. Last spring, however, he thought he could enlist the co-operation of the various directors of the Fruit Experiment Stations, who had the reputation of being careful experimenters, and who therefore could be trusted in carrying out the series of experiments which he should outline. Accordingly the following circular was sent to all the Fruit Experiment Stations of the Province:

DEAR SIR,—I have thought for some time that the various experimenters of the Ontario Fruit Experiment Stations might be of great assistance in testing new methods of treating Insect and Fungous Diseases. As official Entomologist and Pathologist in the service of the Department of Agriculture, I have taken upon myself the task of outlining a series of experiments, which you will be good enough to try. At the close of the season, kindly report the results to me.

1. *Cucumber Beetle.*—Experiment—Mix one ounce or so of turpentine in a gallon of ashes and stir thoroughly. Drop a tablespoonful on each melon hill.

2. *Cabbage Root Maggot*—Experiment I—Put a tablespoon of carbon bisulphide in a hole at the base of the young transplanted cabbage, and cover up the hole, so that the fumes will not escape. Experiment II—Spray forcibly some carbolic acid emulsion (made by dissolving 1 lb. hard soap in one gallon boiling water, and adding 1 pint crude carbolic acid, and emulsified by agitation), about the base of the plant, some of the earth having been first removed. Replace the earth. Repeat once a week.

3. *Onion Maggot.*—Try experiment outlined in 2.

4. *Codling Worm*—Try "Burlap" or "sacking", as outlined in March *Canadian Horticulturist* p. 88, to prevent the attacks of the second brood. Be careful to spray well with Paris Green and Bordeaux right after bloom to kill as many of the first brood as possible.

5. Any other experiment you may think wise to try.

I shall be pleased to receive a full report of the action of these insecticides. I am,

Yours very truly,

W. LOCHHEAD.

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The director of this section has the pleasure of making a short report of results arrived at. He does not claim that valuable results have been secured, but he does claim that the insects against which the experiments were directed are among the most injurious of the garden and orchard, and are among the most difficult to treat, successfully. Therefore, any successful method of treatment must be welcomed, and all traditional, useless methods now adopted ought to be discarded.

The experiment outlined to be tried against the Cucumber Beetle is one which has been tried for a long time, and was selected because Prof. Van Deman recommended it in *The Strawberry Culturist.*

The experiment against the Cabbage Root Maggot is one recommended by Prof. Bailey.

WITH CUCUMBER BEETLE.

Harold Jones, of Maitland, reports that he found no beneficial results from the turpentine and ashes,in fact on some squash hills the plants were completely destroyed by insects. Melons did not suffer as much. Had good results from dusting with fine wood ashes when the dew was on in the morning.

A. E. Sherrington, of Walkerton, reports that his experiments with ashes and turpentine were not a success. He used white hellebore with success.

CABBAGE ROOT MAGGOT.

H. Jones, of Maitland, reports that when the carbon bisulphide was put in a hole nearer than 3 inches the plants were killed, and all plants injured even as far as 4 inches.

WITH ONION MAGGOT.

G. C. Caston, of Craighurst, finds that the best remedy for this maggot is to watch the onions while hoeing them and to pull up any that were wilting and destroy the maggots.

S. Spillet, of Nantyr, states that after the application of good strong hard wood ashes on the land and raking it in he has not seen a maggot—and this for three years.

BURLAP FOR CODLING WORM.

A. W. Peart, of Burlington, reports that he experimented with burlap on 100 trees, applied about the middle of June. By middle of July he found worms in burlap forming cocoons, and destroyed large numbers of cocoons. He believes that the burlap is very satisfactory, but it requires vigilant and regular attention, otherwise it is worse than useless. From 30 to 40 per cent. of the exportable apples were rendered valueless for export. He will use burlap next year very systematically.

G. C. Caston, of Craighurst, reports success with burlap, and thinks it is much better than late spraying.

R. L. Huggard, of Whitby, reports that he has comparatively little wormy fruit this season owing to persistent spraying.

M. Pettit, of Winona, reports that he bandaged his apple orchard about 15th of June, and when he examined them two weeks later he destroyed on an average 25 to 75 larvae on every tree. Later examinations did not reveal so many worms, but his apples were badly destroyed. His orchards are near the foot of the mountain where codling worms are very destructive every year.

S. Spillett, of Nantyr, reports that the trees sprayed early with Paris green and milk of lime, and afterwards with Bordeaux and Paris green, were almost clear of bored fruit, while those not so treated were destroyed to a large extent.

H. Jones, of Maitland, states that careful spraying at time of fruit-setting seems to control the worm effectually. In some cases he captured 3 to 10 pupae under burlap. He has less than 1 per cent. wormy fruit.

W. N. HUTT: How long does the codling moth stay in that stage?

MEMBER: I imagine somewhere between ten days and three weeks.

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A. W. PEART: In regard to this subject as presented by Prof. Lochhead, I may say that in a note to the professor on the subject of the codling moth I expressed the opinion, or rather I ventured the suggestion, that there might be more than two broods in the Burlington District. My reason was that in examining the bands of burlap I found the worm in them in different stages. I found some in there without any cocoon; I found some in the pupa state, and again in that same band on the same day I would find that they had broken through the cocoon, and passed away. This went on from the last of June or early in July until the first of October, and I came to the conclusion that instead of there being two broods, perhaps there were three in the Burlington District. If there are only two the line of demarkation is not very distinctly marked.

MEMBER: I do not know that this burlap business is quite well understood throughout the country. The object is not to prevent the damage done by the first brood, but to cut off any subsequent broods. If you find any moth under your burlap you may be sure some damage has been done to the orchard, and by cutting them off at that stage you prevent subsequent damage. The best preventive I find for all insect life is caustic soft soap. Just now it is not dealt with as a commercial article, and consequently may be rather expensive. A solution of that will deter, if not kill, any insect I know anything about.

Q. How does it differ from our ordinary soft soap?

MEMBER: It is made from linseed oil, I believe.

Q. Is it more effective than crude oil?

MEMBER: Yes, sir. With squash bugs, even, it will effectually clear your vines off from them. But the trouble is where you have a large quantity of these plants, and the insects are underneath the leaves, it is somewhat difficult to get at them. You have to get upon them and spray with the elbow on the hose. It is rather an indefinite way of doing it; you are not sure you will hit them, but if you do hit them you will kill them. The use of the soap has another effect. It is a great stimulant to the plant, and when they are healthy they are much better to resist the attack of any insect than when allowed to become weakened.

MEMBER: As a matter of fact it is the second brood that does the great damage. The first brood of codling moths in many cases simply kills the fruit; it is the second and subsequent broods that really are the great injury, and if the burlap tends to diminish the succeeding broods it will have done a great deal, and in some cases all that is necessary to preserve the fruit, if effective.

Major SHEPPARD: There is a phase of the question that has not been touched at all that I think is important. It has been suggested that there are more that two broods of codling moth in the Burlington District, from my observation in the Niagara District I am of the opinion there are a great many more than two broods. They seem to be at it all the time. You take the greatest trouble, and do your best to get up a barrel of fruit in perfect condition, open that barrel of fruit in eight or ten days, and you will find a great many apples have been bored. Where have the worms come from? They simply have been developed after the fruit has been put in.

A. MCNEILL: If you see an apple that has advanced farther than its real stage of ripeness, you may take it as an indication that there is a worm there. Apples which an ordinary person would consider good, apple-packers reject because they are pretty sure there are worms in them.

Prof. LOCHHEAD: The conclusions we may reach regarding this discussion on the codling moth are: (1) In districts where there is but one brood, careful spraying at the proper time will produce nearly perfect fruit. (2) In districts where there are more than one brood the *burlap* is of very great service in checking the ravages of those worms produced from the first brood which have escaped the early spraying, but will not prevent moths from neighboring orchards, as at Winona, from flying over and depositing their eggs on well-formed fruit. Hence a strong necessity for municipal action in enforcing spraying and bandaging.

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REPORT OF CO-OPERATIVE EXPERIMENTS IN ECONOMIC BOTANY.

M. W. Doherty, B.S.A., M.A., Agricultural College, Guelph, Ont.

The work of the committee on Economic Botany during the past year has been directed mainly along lines which we hope in the very near future will supply us with a more or less exact knowledge of methods of weed eradication which are both efficient and practical. Your committee has deemed this line of work worthy both of their efforts and of your hearty co-operation because, in spite of the fact that new weeds are constantly making their appearance in the Province and the more familiar species are rapidly spreading, there is a lack of general knowledge of methods of eradication which have actually been tried and found efficient and practical from a farmer's standpoint.

A circular letter was sent out to the members of the Experimental Union asking each to send the name of their most troublesome weed and offering on our part to suggest a method of eradication, the result to be reported at the end of two or three years according to the method proposed.

The following weeds are being experimented with: Wild Tares (Vicia caracca), Wild Mustard (Brassica sinapistrum), Pigweed (Amarantus retroflexus), Ragweed (Ambrosia artemisiaefolia), Perennial Sow Thistle (Sonchus arvensis), Chicory (Cichorium Intybus), Twitch Grass (Agropyron repens), Mallow (Malva rotundifolia), and Bindweed (Convolvulus arvensis).

In connection with these co-operative experiments we wish to acknowledge our indebtedness to Prof Day and Mr. Zavitz for valuable suggestions as to methods.

Spraying to Kill Mustard.—Experiments were carried on in destroying mustard by spraying with a solution of equal parts of blue stone and iron sulphate. Six pounds of each dissolved in forty gallons of water. From the reports received and from the results of experiments carried on by the committee for the past two years we would advise a solution of ten pounds of blue stone dissolved in forty gallons of water in preference to the solution of six pounds of blue stone and six pounds of iron sulphate in the same quantity of water. The spraying should be done as soon as the mustard comes into bloom, and the application may be made with an ordinary fruit tree spraying machine placed in a cart drawn by a horse.

Weeds in Public Schools.—An effort was made during the past year to introduce collections of weeds and weed seeds into the public schools. A few of the public schools each received a set of nine of our bad weeds, correctly identified and mounted. Sheets giving full instructions as to the proper methods of pressing and mounting plants and a method of eradication for each species, accompanied each set.

One school in each of the following counties received a complete set of weeds, etc.: Huron, Lincoln, Carleton, Frontenac, Ontario, Wellington, Russell, Simcoe, and Essex. The collections consisted of the following weeds: Wild Flax, Bindweed, Twitch Grass, Pennycress, Perennial Sow Thistle, Ragweed, Blueweed, Pigweed, and Bladder Campion.

By this rather insignificant effort on our part, it is hoped that the schools will be encouraged to continue the work of collecting and studying the weeds of their districts, in order that any "new comer," which might in time prove troublesome, will be quickly identified and exterminated. It is possible that at a later date circumstances may permit the scope of the work to be extended.

Sale of Weed Seeds.—Of the sets of weed seeds in the hands of the committee twenty sets were disposed of to members of the Experimental Union. There is no danger but that we shall be able to supply all who wish to purchase sets of these seeds for two or three years to come.

REPORT OF CO-OPERATIVE EXPERIMENTS IN SOIL PHYSICS.

By Prof. J. B. Reynolds, Guelph, Ont.

The results of experiments in testing the physical effects on the soil of different methods of cultivation was divided into three classes: drilling only, drilling and rolling, and drilling and rolling and harrowing. Four experimenters in different parts of the

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Province conducted nine experiments, on a total of 27 plots. The reports could not be said to be conclusive, and another year, and possibly longer, would be required to reach a definite conclusion. Owing to a lack of suitable appliances, the temperature could only be taken at the College, and not by the other experimenters. In the College tests, the highest temperature was found in the drilled and rolled ground at a depth of one and two inches, and the lowest temperature in the drilled, rolled and harrowed ground. The rolled plots led in point of early germination, but the crop results did not fulfil the promise of this early start. This investigation is of vast importance, and should, when conclusive results are reached, prove of great benefit.

REPORT OF CO-OPERATIVE EXPERIMENTS WITH EGG PRESERVATIVES.

By W. R. Graham, B.S.A., Agricultural College, Guelph, Ont.

The question of preserving eggs is of interest to all classes of people—farmers as well as others. The preservatives which I shall bring to your attention are specially fitted for family use rather than for dealers. Dealers want a preservative that is first class and yet easy to handle, while for domestic use, the quality of the preserved egg is of the first importance. The best processes for the export trade are termed glycerine processes, but, unfortunately, the majority of them are patented or else are entire secrets. The preservatives I shall present will give fairly good results under ordinary treatment, and they are also cheap. The methods are three in number: first, water-glass, or silicate of soda, largely used in Germany; second, a lime solution; and third, common salt.

Water-glass you can buy from any druggist. The price varies from 75c. to $1 per gallon. To prepare the water-glass, you take ordinary water that has been previously boiled to destroy germ life, and to every five gallons of water add one gallon of water-glass. This is as strong a solution as it is possible to use, and in order to use it the the eggs must be perfectly fresh. Eggs that are two or three days old will float in the solution. In our experiments we were unable to purchase eggs that would not float.

The next solution used was one part of water glass to eight of water. Our experiments in previous years indicated that this gave equally good results with the one-to-five solution.

The next experiment was with a one to ten solution. While this is a fair preservative, it has not given equally good results with the two former solutions.

I find, judging from the reports from the different experimenters, that some people are somewhat prejudiced in their ideas. If they are used to one kind of preservative, they consider that is the best. A number have great faith in salt as a preservative for home use. On the other hand, two experimenters claimed that every egg put up in salt went bad. In all cases, so far as possible, the salt packed eggs were placed in an ordinary cellar. Some cellars would be damper than others, but the results should be pretty much the same in all cases. The weakness of the salt preservative is that the egg dries at the top. The result is that there is frequently a space at the top large enough to hold a 25c. piece, while you could not put more than a five cent piece in the end of an egg preserved in water glass.

In order to arrive at systematic results in our experiments we adopted a system of scoring, taking eggs that were absolutely fresh as our standard of comparison. We allowed ten points for each of the following properties: 1, flavor; 2, density of white; 3, toughness of yolk; 4, beating qualities; 5, poaching qualities. The following explanation of terms was sent to each experimenter:

Evaporation. Carefully note the size of the air cell at the large end of the egg.

Flavor. Can be best judged by testing, and in addition by noting the odor, if any.

Density of White. Can be easily detected by noticing whether the albumen or white stands up well around the yolk or spreads over a large surface. Many packed eggs are very tender in the yolk covering, breaking freq . tl when the egg is opened. Kindly note if there is any difference in these lots.

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Beat the whites as used for cooking purposes and note difference if any.

In poaching see whether the white wholly covers the yolk and in addition has a nice rounded appearance.

N.B.—It is well to use at least *four* eggs in each test and compare from all tests at one time.

We would also be pleased to receive any general remarks you may think worthy of mention.

Respectfully yours,

W. R. GRAHAM.

We find that eggs preserved in all kinds of preservatives are very tender in the yolk, and there is no egg equal to a fresh laid one when it comes to poaching. The great objection to water-glass is that it is rather nasty after you have had it in use. It is more like extracted honey than anything else I know. After the eggs have been in the solution for two or three weeks, some chemical action takes place. This causes a milky white coating to form on the egg, which thickens as the period of preserving increases. It also hardens more and more, and becomes more difficult to remove. It is removed by placing the eggs in warm water. The experimenters all complain of this difficulty. While they like the eggs that have been preserved in water glass, they would like to know some method of removing the precipitate. Dr. Shuttleworth is now experimenting with this substance, and may be able to tell us how it can be dissolved.

I am of the opinion that after water-glass has been used once it is no further use. Some chemical action appears to take place between the water-glass and the shell of the egg. If that is the case, the water-glass would afterwards be useless.

Taking first the eggs preserved in water-glass in the proportion of one to five, two experimenters reported that they could taste the water-glass on the the eggs, but others reported that no taste whatever was observable. Some reported the flavor up to 9 points, while others reported it at 10 points, or equal to fresh laid eggs. On the average, we found that these eggs scored a total of 42$\frac{3}{4}$ points out of a possible 50.

An egg preserved in water-glass is perfectly clear, and unless you are an expert, I doubt whether you could tell it from a new laid egg unless you cooked it.

The lime solution is rather peculiar in its action: you will probably find eggs taken from the top are in good condition, while in many cases, eggs that are taken from the bottom are quite strongly flavored by the lime, while the yolks are partially cooked or hardened. Probably this is due to an excess of lime; but if we used less, we might spoil the eggs at the top while saving them at the bottom. The eggs preserved in the lime solution scored 8$\frac{1}{4}$ points out of a possible 10 for flavor, and a total of 39$\frac{3}{4}$ points out of a possible fifty.

The eggs preserved in salt did not give such good results. Two experimenters reported that the eggs all spoiled. The shrinkage is also an important objection to this method. A great many experimenters said that the whites of the eggs so preserved were somewhat thicker, which is probably owing to the shrinkage. I am of opinion that the skin of the yolk of salted eggs is tougher than the skin of the yolk of fresh eggs, as I find it is rather more difficult to break. All the experimenters except two reported some bad eggs by this process. An average of all the experiments in the salt preserved eggs gives 5 5-6 points for flavor, and a total score of 31$\frac{1}{4}$ points out of a possible 50.

As to the result of these experiments, we find that the first two solutions of water glass comes first and the lime solution second. A majority of the experimenters claim that they would prefer the lime solution to the water-glass unless some method is devised for making the eggs more easy to handle. After six or seven months they become coated with a cheesy mass, and have to be cut out with a spoon or fork. After this was dissolved the appearance of the egg was much better than that of eggs preserved in lime or salt, being very little different from a fresh laid egg, while the others have a shiny appearance.

Q. What effect has the fertility of the egg on its keeping qualities?

Mr. GRAHAM: In our experiments, we used infertile eggs. There is no germ in the infertile egg and very little chance of putrefaction. A fertile egg kept for twelve hours in a temperature of about 85° begins to develop. As soon as the development is arrested then putrefaction sets in. It is a very common thing in summer to get eggs heated up to 85 or 90°. That being the case you cannot expect to get first-class eggs in summer

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when the male bird is allowed to run with the flock. Dealers find that out of 100 doz. eggs packed in July and August, where male birds run with the hens they rarely get two dozen good ones that will stand on end in the pickle. Eggs gathered during those months under such conditions are always unsatisfactory in every way; you cannot put them on the table, and the only thing you can do is to sell them to the confectioner.

Q. What strength is the lime solution?

Mr. GRAHAM: Two pounds of lime, one pound of salt and four gallons of water. We have found this solution without any salt very satisfactory, but not quite so good as when a small amount of salt is added. With water-glass, if you put in the eggs first and then the solution, the bad ones will not come to the top, as the good ones hold them down, so that the process must be reversed.

Q Must they be put point downwards?

Mr. GRAHAM: You will find they will go that way in all cases.

Q What consistency is the solution after it is mixed?

Mr. GRAHAM: Not much thicker than water.

Q. Do you cover the vessel?

Mr. GRAHAM: You can suit yourself; so far as our experiments go, the eggs keep equally well without a cover.

Q. Do the keeping qualities at all depend on the temperature at which the solution is kept?

Mr. GRAHAM: With water-glass, the temperature does not seem to make any difference. I tried an experiment with a small number in the boiler-room, where the temperature was sometimes 180° or over, and I found them nearly equal to eggs kept in the cool cellar.

Q For how long will eggs keep in that solution?

Mr. GRAHAM: We had some in for fourteen months that poached as well as those that were in for six months. The moment you fill the pores of the shell there is no chance for incubation.

Q Do you ever find that sometimes fresh eggs will not sink?

Mr. GRAHAM: Never in my experience except one or two; although I had two reports from experimenters shortly after I sent out the solution, who were unable to get the eggs to sink.

Q Does the color make any difference?

Mr. GRAHAM: In most cases I think you will find that brown eggs will sink easier, and that the white of a brown egg is slightly denser.

Q. Is there a difference in specific gravity?

Mr. GRAHAM: Some experiments tend to show that; others do not, so that I cannot say definitely.

Q Is there not a marked difference in the density of the shell?

Mr. GRAHAM: The shell is largely influenced by feed. You can also feed any flavor you wish into an egg. If you do not believe it, feed the hens on onions for a week.

Q. Have you a satisfactory preservative now?

Mr. GRAHAM: Fairly so—the first two water-glass solutions and the lime solution.

Mr. WILSON: As a packer, I am naturally interested in this question and came here for information. I certainly have received considerable. I do not think it would be wise to encourage the farmers to preserve eggs that are intended for export purposes. Packers prefer to receive the eggs fresh and do their own preserving, because in that way we have a uniformity in the article. If each farmer endeavors to preserve his own eggs we shall have the same results as when each man cured his own pork and made his own butter. The general result will not be so good. Our preserved eggs have sold as high as fresh in England.

Mr. GRAHAM: Our idea in giving these solutions is that they should be employed only for home use. We do not desire to induce people to preserve eggs for four or five months, and then sell them as fresh laid. It is all right to sell them locally and in the winter time, but it would certainly not be desirable to sell them to the packer.

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INFLUENCE OF THE EXPERIMENTAL UNION WORK.

By Hon. John Dryden, Minister of Agriculture, Toronto, Ont.

I am very glad to welcome so many of you here to-night, and I want to say that among the many organizations in the Province of Ontario for the promotion and advancement of agriculture, in my judgment there are none of them of more importance than the Experimental Union, under whose auspices we gather here to-night. From a very small beginning, entered into by a few of the ex-students of this College who had a desire for mutual helpfulness, and who probably had no thought of the good that would come out of the organization which then had its inception, this organization has extended from east to west, from the south to the north, over our Province until it has in itself become a sort of net work. The experiments carried on by this Union give added interest to the work of the experimenter no matter where it may be found, and not only does the country generally get the benefit, but he who enters upon the experiment benefits on account of him who enters into similar experiments in all parts of the country. It is a search after truth, so that when the truth is discovered we may declare it, that the whole country may receive the benefit. And I would like to say that in my judgment this Experimental Union has added thousands of dollars to the progress of agriculture in the Province of Ontario already. It is a public-spirited work. While it is true that the private individual gets some benefit which others may not receive, like all the other work of the farm this must be done in the open field. We have to depend on God's sunshine, on God's rain, and therefore we must go out into the open. We cannot shut ourselves up in a room like our manufacturing friends, and put over the door, "Positively no admittance." Whatever is done must be done so that the onlooker can see. And the result is that the value of the experiment is extended beyond the individual, and the public receive the advantage. The principal object which is held in view is that we may give our quota towards furnishing the country and the world with pure food products, which bring blessing and comfort and contentment to all the people. We are glad to welcome with us to-night Prof. Roberts, who you will be permitted to hear, coming from a neighboring university, to which, I may say, we are accustomed to look when we want to discover advanced methods in various subjects. We shall be glad, I am sure, to welcome him and listen to what he has to say to us.

IMPROVED METHODS OF FARMING.

By Prof. I. P. Roberts, Cornell University, Ithaca, N.Y.

The farmer may pay anywhere from $20 to $200 per acre for land. In the purchase he pays for three things—first, location and the right to occupy the land to the exclusion of others; second, the plant food in the soil; and third, the things which are upon the soil as houses, barns, trees and the like. The cost of all these usually makes a severe drain upon the purchaser's resources. He must now give the larger part of his energies to making the land produce crops which shall not only pay interest on the first investment, but for the labor expended, and in addition to this he desires to secure profits. Usually all of the returns come through his ability to transform dormant plant food in the soil into saleable organic matter.

We will ignore the value of location and the buildings for the present, as these can always be easily determined. We are most concerned about the possibilities of the land, for all success in agriculture has its beginning in the soil. The average of twenty-nine analyses of rather lightish soils from various localities shows that the first eight inches contained, in round numbers, 3,000 lbs. of nitrogen, 4,000 lbs. of phosphoric acid and 16,000 of potash per acre, and the second eight inches contained 4,000 lbs. of nitrogen, 1,800 lbs. of phosporic acid and 6,800 lbs. of potash.

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The first thing that attracts our attention is the vast amount of nitrogen in the subsoil. It is evident that some of the nitrogen of the surface soil in these light lands had been washed into the top of the sub soil, and we get the first hint, in this case of how to manage this land. Here we want tap rooted plants that will bring the nitrogen from the sub soil to the surface. It is not usual for the sub soil to contain more nitrogen than the surface soil, though in sandy lands this may be and frequently is the case.

The best part of the soil, so far as total nitrogen is concerned, is sometimes found in the first eight inches of the subsoil, the nitrogen in the surface soil having been washed down. We find these lightish soils contained per acre on an average 7,000 lbs. of nitrogen, 5 800 lbs. of phosphoric acid and 22,800 lbs of pot ash in the first sixteen inches of soil. It would be interesting to figure how many tons of commercial fertilizers with a composition of 4 per cent. nitrogen, 4 per cent phosphoric acid and 8 per cent. potash it would take to furnish as much plant food as is contained, on an average, in these soils which were analyzed, and it would be still more interesting to compute the cost of this amount of plant food if it had to be purchased in the form of commercial fertilizers.

The question naturally arises, why land which contains such an abundance of plant food usually fails to produce a full crop? Under present methods, from such land is often secured only half of a really good crop. Presupposing that the climate is suited to the plants grown, three factors then play an important part in productivity—*available* plant food, moisture, and the physical condition of the soil.

In practice we find that the larger part, in fact nearly all of the plant food in the soil can not be used by the plant because, first, it may be tough plant food, second, there may not be enough moisture present, and third, the physical conditions of the soil may be such that the plant will not be comfortable.

With the exception of nitrogen, nature seeks to conserve plant food in the soil by locking it up; and, in many cases, the nitrogenous compounds also are locked up by nature's forces and made unavailable. The business of the farmer is to so cultivate and manage his operations as to unlock and make available some of the plant food which has laid in the soil for ages and so far as any good it has yet done might as well not have been created. Some of this lazy plant food is owned by lazy farmers and some of it is owned by farmers who have not yet comprehended the first great principles of successful crop production. If we analyze the crop which is taken from the land it is found that only a small proportion of the total weight of the plant has been taken from the soil, and a still smaller proportion of it is composed of the three leading elements which are likely to be either deficient in the soil or unavailable.

Wheat is one of the most exacting plants that we grow, requiring not only an abundance of readily available plant food but also superior conditions of the soil. In 1890, the average yield of wheat in the United States was 14 bushels per acre. If we allow that two pounds of straw are produced for every pound of grain, it is found that the average wheat crop of the United States removes from each acre of land 29.73 lbs. of nitrogen, 9.49 lbs. phosphoric acid and 13.69 lbs. of potash. When the amount of plant food taken from an acre by an average wheat crop is compared with the amount of plant food in each acre of soil, we immediately wonder what factors have entered into wheat culture to produce such a paucity of yield in the presence of such vast stores of potential plant food.

It may be said that some reserve must be carried in the soil, and that by no method can the soil, by cropping, be exhausted of all of its potential power. But something must be radically wrong when the farmer fails to get out of the soil, by means of a wheat crop, less than 53.91 lbs. of nitrogen, phosphoric acid and potash all told, when the soil analyzed contained 7,000 lbs. of nitrogen, 5,800 lbs. of phosphoric acid, and 22,800 lbs. of potash, per acre.

Then the prime effort in agriculture should be to transform tough and lazy plant food into available plant food. It is not the amount of plant food which soil carries, but rather the amount of food which the plant can secure during the crop season which governs productivity and profit or loss. To show how a soil carrying a limited amount of plant food may be made to yield large returns by superior tillage, I quote from some experiments conducted at the Cornell University Experiment Station.

From some plats in 1895, 6,967 lbs. of dry matter per acre of maize and stalks, equal to 31,600 lbs. of green material, were harvested per acre. From other plats 26,000 lbs. per acre of green oats and peas in the following year. These plats have been pro-

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ducing since an average of 300 bushels of potatoes per acre except during the present year of severe drouth, when they produced nearly 200 bushels per acre. This soil was not treated with commercial fertilizers or farm manures, nor has it been for the last six years. A sample of it was analyzed, and it was found that one acre one foot deep weighed 2,082½ tons. The soil contained 172 tons—that is 8.25 per cent. of moisture. A portion of this soil was passed through a sieve of $\frac{1}{25}$ of an inch mess, which divided it into two portions. The fine portion was found to constitute 56.79 per cent. of the soil, and the coarse portion, or gravel, 41.85 per cent. The coarse material was finely powdered by mechanical means and analyzed, with the following results:

Amounts calculated per acre (ONE FOOT DEEP), *in fine material.*

Nitrogen	3,074.9	lbs.
Phosphoric acid	3,784.5	"
Potash	12,063.0	"

In gravel.

Phosphoric acid	4,009.0	lbs.
Potash	11,329.8	"

Fine material and gravel.

Nitrogen	3,074.9	lbs.
Phosphoric acid	7,793.5	"
Potash	23,392.8	"

If we take two-thirds of these amounts (which would fairly represent the amount of plant food contained in the first eight inches) in order to compare with the average amounts contained in the twenty-nine soils analyzed, it is found that this soil carried only a little more than half as much plant food as did the twenty-nine soils, and yet the crop was probably twice as large as on these soils which were abundantly supplied naturally with nitrogen, phosphoric acid and potash.

This raises the question as to how much potential plant food it is necessary to carry in the soil in order to secure the most economical results. I am fully persuaded that most soils are carrying two or three times as much plant food as they need to carry to produce good crops. There is not so much danger of reducing productivity by rational cropping as there is by ignoring the laws of plant growth and the principles of tillage.

Jethro Tull said, "Tillage is manure." This is not strictly true, but tillage may well take the place in part of manure. To make available the tough and lazy plant food of the soil, I believe the plow should be used more extensively than it is. As a rule, we do not plow deep enough nor often enough. Of course there are lands in the west that are so light and loose, and which contain plant food so available, that too frequent plowing may be detrimental. We can all very well understand this. But with a large preportion of our eastern lands the tendency is for them to become hard; in fact so hard and compact that the water cannot percolate through the soil in a reasonable length of time, neither can the proper amount of air be held in the soil, and lacking friability the plant food instead of becoming more available tends, as time goes on, to become less and less available. This leads us immediately to the thought of underdrains when we have to deal with the most refractory soils. When they are not too tenacious, deeper and more frequent plowing may serve all purposes. Plowing tends to allow the water to percolate through the soil, aerates it, thereby permitting it to "weather," it hastens nitrification and tends to improve the physical conditions of the land, which are often of prime importance. A plant that is uncomfortable never reaches its full standard of perfection. Plowing also permits a more efficient and rational tillage of the surface soil. It would extend this paper to too great a length to go into details of the shape of the plow, when to plow, and how to plow. It is self-evident that some improved methods of agriculture should be introduced, since out of these vast stores of plant food contained in most arable soils in the first sixteen inches, the farmer, as yet, is able through plants to utilize each year in wheat culture but 53 pounds per acre, all told, of the three valuable plant foods which are sometimes deficient in soils. A good soil may contain plant food sufficient for from 600 to 1,000 average crops of wheat; which average, however, is less than one-half of what it should be.

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What if twenty-eight bushels of wheat were raised instead of fourteen bushels per acre? Would, the land soon be depleted so far as to seriously reduce productivity? Well, if you are fearful that one hundred to two hundred years hence some one may have to apply commercial fertilizers to preserve the normal yield, then you should raise small crops or none at all. Far better preserve and increase productivity from year to year, and then the future will take care of itself, for if the land produces abundantly you need not be solicitous about the quantity of potential or lazy plant food which the soil carries.

What are the methods for preserving and increasing the productivity of the land? First, better tillage (and this term I use in a generic sense), which begins with hot plow shares and ends with a fine earth mulch; that is all those numerous operations by a varied assortment of implements which arouse the potential lazy plant food and makes it more available, which tend to conserve moisture, and to make the soil comfortable for the growth of high class agricultural plants. Too many are still practicing squaw farming; they scratch the land, cast in a few seeds and go fishing or into town. In many cases this lazy plant food is best whipped up by light applications of lime. Sometimes it is made available by fall plowing, by freezing, by "weathering," by frequent tillage, and by compacting the soil at certain seasons of the year and for certain crops. Having whipped up the soil by smiting it intelligently and often, still the highest profitable yield may not be secured, very often because the plant food has become so fearfully lazy that no amount of application of hot plow shares will force it into activity.

It is often found that an application of well preserved farm manure not only adds plant food but materially assists in making available plant food which before had been unavailable. Humus in the soil plays a very important part in crop production. Then to increase productivity it will be necessary to preserve as carefully as possible all barn manures, and apply them in the most economical way. Nature raises plants to feed animals and then scatters the refuse manures thinly on the surface in the fall or early winter where plants are growing. We may not follow nature's methods always because conditions are not always suitable, but wherever they are suitable no better method of applying barn manures can be practiced. I need not say that the conservation of manures about the barn is one great factor in improved farming.

Still the land may not produce satisfactorily although it is drained and looks to the casual observer as though nothing more was wanting. We have seen that often the second eight inches of soil is as rich or richer than the first eight inches. This indicates that tap rooted plants should be grown in the rotation—rape, turnips, and, best of all, clover. But it happens that in most of the north and east countries but one harvest crop can be raised in a season. This results in allowing the land to lie bare, or at best sparsely covered with noxious weeds for four to six months of the year.

We have seen, and I think proven conclusively, that most of the plant food in the soil is lazy. Then why not keep the land at intervals between crops covered with living plants that they may "digest," shall I say, some of this tough material, and build it up into organic structures, that subsequent harvest plants may easily secure nourishment from this cover crop when plowed under and partly decayed. Unless it has been found wise to fall plow, then sow in the harvest crop, or immediately after the harvest crop has been removed, such cover crops as experience has shown to be most satisfactory. Even where it is desired to practice fall plowing a cover crop may frequently be raised between the time that the field is relieved of its harvest crop and the time of late fall plowing.

I think then we may sum up the three great elements of improved methods of farming. Having fitted the land by sub-draining, and plowing also in the best possible manner, having preserved and applied intelligently all barn manures, having kept the land covered so far as possible throughout the entire year with living plants (cover crop), and still not having secured the productivity which we desire or should naturally expect, the opportunity is open for experimentation. How shall we find out why the results are not as complete as we have a right to expect from our improved methods? It may be that a little lime would greatly increase the yield, but no Professor of Agriculture or Chemist is likely to solve such problems without actually testing the soil with growing plants. Grant once said that the way to resume was to resume. The way to find out is to find out. It is not a very serious job to apply a bushel or a barrel of lime to a given area, and to compare the yield of this area with a like area adjoining. Or it may be that one

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of the principal elements, as phosphoric acid, is lacking. The way to find out whether this be so or not, is to find out,—by applying phosphoric acid and noting results. These investigations or experiments may be carried on very cheaply and accurately by any farmer if he is not like some of the plant food in the soil—lazy.

In like manner nitrogen or potash or both of them combined can be tried. In other words, if we want to know more about the effects of tillage, manures, cover crops and commercial fertilizers and the like, the safest and surest way of making new discoveries is to ask questions of the plant.

Now comes the interpretation. The conclusions must not be jumped at but every step in the investigation should be verified because he who tells a lie to himself, having a truthful plant, cannot filch from the plant its good name but it will make him poor indeed. Having exhausted all home resources to make the land more productive, and not having fully reached the desired goal, and having found out the story of the plant by questioning, the farmer is prepared to know accurately whether he can afford to buy nitrogen at 12 to 15, phosphoric acid at 7, and potash at 4½ cents per pound respectively. It may be that he can, in rare cases, buy this nitrogen at 12 cents per pound, transform it through the plant into wheat, and sell the wheat at one cent per pound but the chances are that in this operation he will lose money no matter how much wheat he raises. Nitrogen being the most expensive of the three elements desired and being easily procurable through cattle foods having a high content of proteids and leguminous plants, I think that it may be safely set down as a sound principle in agriculture that the farmer should aim to secure all the nitrogen wanted through these two channels. Not so with the mineral constituents. These, in time, may become depleted. and so far decrease production that the only way to secure them is by purchase. But both of the mineral constituents, potash and phosphoric acid, are low priced as compared with nitrogen, and usually in cereal culture only the phosphoric acid is likely to be deficient in well managed land.

But it is both foolish and unprofitable to buy high priced plant food when there is abundance of lazy plant food in the soil which can, by better methods of farming, be made available. As a rule too, the farm is the place from which we should sell things, and not the place to which we should bring things purchased in the city. Our people are now rejoicing because the balance of trade is in our favor, that is, we sell more than we buy. In like manner, the farmer must plan to keep the balance of trade on his farm, that is, sell more than he purchases. Competition in all farm products has become so great that no adequate remuneration and profit can be expected or secured from farming, unless improved methods be practiced and the greatest skill be shown in the direction of nature's forces. That is, we are to work in harmony with nature and not antagonize her. To do this, one should be fairly well acquainted with nature's modes of action, and the best place to get this knowledge, in our generation, is at an agricultural college.

Mr. Wm. Rennie: The first part of the lecture suited us all exactly. The lecturer spoke about the mineral fertility of our sub-soil. That we are all agreed on. Talk about worn out lands; there is no such thing. The sub-soil is as good to-day as it ever was. What we have to do is to make it available and bring it to the top. About turning up the sub-soil, we are not doing that part of it. At the College we prefer to let the roots of the clover plant do that. We are just leaving that to tap-rooted crops following a system of rotation, so that one crop is having the privilege of feeding another crop, and the result is simply marvellous. When you spoke about plowing deep and turning up this fertility, I wondered if Prof. Harrison were here. He tells us about the innumerable bacteria working on the vegetable matter at the surface. Nature has put them there to make it available for plant food. We take about as good care of those germs as though they were animals. We are all agreed as to the necessity for keeping Mother Earth covered. A gentleman in the old country told me that they were getting the best results from their steam plows by not plowing with them but loosening the sub-soil 20 inches deep with them—not bringing it to the surface. Break it up and let the air in so that the plant can bring the mineral fertilizer to the surface. Instead of burying the humus, you want it on the surface where it is most valuable. With regard to the thousands of deserted farms in the New England States which we have heard so much about, how is it that they have been abandoned? The soil was fairly good in the beginning, but no fertilizers have any effect on these farms. Sense

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teaches us that you must have vegetable matter to act on. Fertilizers are of no use whatever—they leach right away unless you have vegetable matter.

Prof. ROBERTS: I am glad you have called my attention to the matter of deep plowing, and I think I have been a little misunderstood. I do not mean to advocate that you should bring up the subsoil. A good many of our people till their soil only four inches deep, whereas I think they would get much better results if they had eight or ten inches of good soil. Still I am not advocating that the sub-soil should be brought to the top. If we have to run the plow through in order to let the water through, leave the sub-soil down there. The soil of New England is formed of granite disintegrated by glaciers. It is often fairly rich, but it is very tough, and the white man got there before the glaciers finished the job. It is filled with granite pebbles, sand, etc., and although you send the hot plow-shares through it as often as you like, it is extremely difficult to liberate plant food. They tilled it long enough, but they did not keep up the covering crop. Then the timber never should have been cut from the hillsides, leaving them bare.

Mr. ANDREW ELLIOTT, of Galt, moved a resolution tendering the thanks of the meeting to Prof. Roberts for his address.

In seconding the motion Dr. MILLS said: I have known Prof. Roberts for many years as a man who has endeavored to make the scientific truths we hear so much about thoroughly understood by the common people. That is characteristic of him. He puts it in such a way that you cannot forget it, and while he does that he is a very close observer and keen thinker on all the problems that go to make the difference between success and failure. He was the first man to make a department of agriculture, in connection with a university, a genuine success. It was said to be impossible when that branch of Cornell University was founded. It was said that law, medicine and arts overshadowed agriculture to such an extent that you could never make it respectable. But he has succeeded in developing one of the best departments of agriculture on the continent, and we often send our boys there to take a post-graduate course. He is in hearty sympathy with the farmer from the highest to the lowest, and I have great pleasure in seconding the resolution.

Prof. ROBERTS: I want to thank you most sincerely for this cordial welcome. I have always been cordially welcomed in this country, and it is always a great pleasure to me to come. They say that Canada is but a baby. When was it weighed, may I ask? It seems to me that you have attained a full-grown national life—a little different from ours, but with the same spirit and aspirations. It is a pleasure to find two branches of the Anglo Saxon race engaged in friendly rivalry, to see which can breed the best cattle, raise the best wheat and secure the best footing in the English market.

THE FARMERS' INSTITUTE AS AN EDUCATOR.

BY G. C. CREELMAN, B.S.A., SUPERINTENDENT OF FARMERS' INSTITUTES, TORONTO, ONT

In this new country there are few people so well off that they can afford to fold their hands and watch their neighbors work. We are essentially a hard-working people. The beaver that has been selected to represent us on our shield and banner stands for industry. Our young men and women who have gone out into the world to earn their living have impressed the people with whom they have settled with the idea that they were willing to work. Canadian nurses are in demand in the hospitals of the United States; Canadian boys readily find employment in the large American cities. I have asked merchants in these cities why they employ so many Canadians, and they invariably replied that it is because they are robust, hardy chaps, who never miss a day, and who are willing to turn their hand to any kind of honest labor.

To industry we may also add intelligence and morality, and these three things, to my mind, constitute the fundamental principles of good citizenship. No one denies the fact that our public school system is doing much to foster these things, and yet there seems to be something lacking when we see thousands of boys and girls from fifteen to twenty years of age who have finished their education and yet are not prepared to take up any special line of work and become producers without special preparation. If it is the duty of our Government through our school system to prepare children for citizenship, then

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those in authority should keep constantly in mind what is expected of a citizen afterwards. A good citizen must be a producer. He must give back to his country as much as he takes from it. If he does not produce material things with his hands, "he must by skill or brain produce an equivalent which he can exchange for these material things." He must at least be able to support himself. Therefore, if it is the object of public education to make good citizens it must give to these citizens not only morality, intelligence and a desire to work, but such other training as will make them capable of self support. "This does not mean that every boy in our public schools should be taught a trade, but it does mean that his education should keep him in touch with his environments, so that when his school days are over he will be able to take hold of the practical affairs of life in a practical way; that he will be fitted rather than unfitted for his daily tasks; that he will not be lead to the belief that there is a sort of genteel way of making a living which does not require hard work. As far as possible his education should bring him into close sympathy with the calling in life that he will be compelled to follow after leaving school."

Very important changes have taken place in the theory of higher education in later years. Even those of us who are not yet counted among the older men can remember when he who could write B A. after his name was thought to be a prodigy and one to be revered. Higher education was for the few, and included only those who were to follow one of the learned professions. It offered nothing to the man who worked with his hands for a living. "It stalked the street in broad-cloth, but never looked into a sewer; it did much for men's souls, but very little for their bodies."

But with the discoveries in science taking place in rapid succession, changes in higher education have followed. New studies have been forced into the curricula on account of their practical rather than their ethical value. These met with opposition at first, but their votaries have been able to explain and defend their values on purely educational ground, so that they have in time assumed pedagogical form. Our fathers of learning now agree that the mind grows by what it feeds upon; "by the multitude of sensations that come flocking to it through the senses." As far as the mental development is concerned it is much more important *how* the student studies than *what* he studies. Proving this to be true our best educationists now admit that the mind can grow as well on chemistry as philosophy; that it will expand under the influence of science as well as poetry.

Practical things like steam and electricity have pushed themselves forward, forcing their way into the sacred halls of learning, and have demanded seats beside the chairs of medicine, law and theology. They declared with no uncertain voice that "the best thought and highest culture should be used in developing our industrial arts and in making science the handmaid of toil; that it should arm and equip man for his struggle with the material universe; that our educational system should be so reconstructed that the trained mind, the knowledge and methods of the educated man should be brought to bear upon the solution of the problems of war, commerce, agriculture, manufactures, public health, and government"

The School of Practical Science and our Agricultural College are children of the new dispensation. In the early days boys were actually paid to attend this institution and two sessions were deemed sufficient to equip a student for his life work on the farm. The course is now four years, and while the able staff endeavors to bring all that is good in science, invention and method to bear directly on the work of the farm, yet the student on graduation feels himself only a beginner in the study of the principles underlying the science of agriculture. The Agricultural College, however, filled as it is at this time to its utmost capacity, cannot accommodate more than one per cent of the elegible farmers' sons of Ontario, so the Fathers of Agriculture realizing this decided in 1885 to go out to the masses and preach the gospel of agriculture to every creature. Then was born the Farmers' Institute system in Ontario. With a few meetings at first, this movement has grown until for the year ending June 30th, 1900, we find 98 organized Institutes in the Provine. 715 meetings were held, 3,328 addresses were delivered before 138,982 persons, 18,158 of whom paid their membership fees and joined their local Institute.

In addition to the 99 per cent. of eligible matriculants who do not enter college, we have in our Farmers' Institute school the older brothers and the fathers. These consti-

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tute, as a rule, a most critical audience. The old proverb says, "You cannot teach an old dog new tricks." It is also true that when a man has, as the darkey expresses it, "got sot in his ways," it is hard to convince him that there are better, easier and more economical methods of doing things than he has been practising up to that time. Sometimes a worker comes home from a meeting and reports that he is almost discouraged; that an audience he had addressed was unresponsive and that perhaps after all he had wasted his time. Then in the months that follow letters come to the Superintendent from this very neighborhood asking for further information along lines suggested at their winter meeting. Some seed had fallen on good ground.

Again we find farmers come to the meetings who are incredulous. They sneer at balanced rations, and rotation of crops, and silos and cream separators and improved implements, and then return home and adopt these very methods on their own places. Such men will not admit that they can be taught anything about their business, but when they see a chance to make more money out of the method advised they usually get their own consent to give it a trial. If successful, the Institute seldom gets credit for it, but our workers have long since come to the conclusion that they must try to do good for goodness' sake and to look for their reward in another world.

In dealing with generalities, as we are obliged to, to a great extent, the greatest good the Institutes are doing is in improving the general conditions of agriculture and incidentally increasing the yield per acre of the various kinds of farm crops. We realize that the difference between the average product of the Ontario farm and the highest yield is at least three fold. This difference of 300 per cent. against the average farmer is due to conditions which with the requisite knowledge he can control.

In legitimate banking we have a possible gain of 10 per cent., in manufacturing say 20 per cent., in mercantile operations a possible 15 per cent.; yet the banker, the manufacturer, and the merchant are each better clothed and housed than the farmer. This is due to the regularity of their gains. Is it a matter of little moment that prosperity should be constant to thousands of farmers? Our Department of Agriculture believes it to be of vast importance, and through the Farmers' Institute system are endeavoring to extend the domain of agricultural knowledge.

The question is often asked, why are farmers so much in need of education? I was talking last week with a prosperous Toronto merchant, and in the course of the conversation he said, "I see that you have arranged for over 700 Farmers' Institute meetings for this winter. Why is it that the farmer, more than any other class of producers, needs to be constantly told how he ought to manage his own business?" This seems to be a pertinent question, and there appears to me to be two reasons that may be given for the present state of things in our rural sections. First, the average man is content with simply making a living for himself and family. There is probably nowhere that this can be accomplished so easily as on the farm. A farmer can easily raise pretty nearly everything he eats and too many are content to eat pretty nearly everything they raise. The minimum necessary to existence is so easily produced that few farmers aim at maximum returns from their farms. Second, so many elements and conditions are concerned in the production of plants and animals that no one can calculate the percent of profit derived from any farm product. We are constantly receiving letters from men who propose to engage in some branch of agriculture in Ontario which contain such questions as these: "What average profit might I expect from six cows?" What does it cost to produce an acre of wheat under average conditions?" "Could I make a living with 300 or 400 hens?" These are questions which no one can answer. The manufacturer on the other hand by producing one article under the same roof with the same material and the same class of workmen, twelve months in the year, has only to ask his bookkeeper what the profits are each month or week or day.

The farmer's work is therefore different in every respect, yet there is the same chance for the thinking man to succeed in agriculture as in other pursuits. He must, however, look closely after the wastes or leaks. "Wealth lies in the utilizing of waste. Our city gas works were frequently run at a loss, till the by-products became of value—coal-tar, naphtha, carbolic acid, paraffine and the analine dyes. Our canned meat industry could not exist were it not for the profits derived from the offal in leather, curled hair, combs, buttons, glue, and fertilizers. In the waste of the farm is the fortune of the farmer. If the insects and the harmful seeds could be converted into poultry and eggs

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if all of our native grasses could be turned into beef, mutton and wool; if the waste of the forest could add its contribution to the general good; if the apple, the peach, the pear, the plum, and the cherry could everywhere be substituted for road side thickets, briar patches, and hillside coverings, it would be the inauguration of the millennium of agriculture. Applied science is to discover how these can be profitably utilized; the Farmers' Institute workers are to carry the news to the farmers."

Ontario has made rapid growth along certain lines during the last fifteen years and I shall enumerate some of them in which I think you will agree with me, that the Farmers' Institutes have been a prominent factor.

1. A general improvement in our live stock. This is especially noticeable in our dairy herds. Until the Babcock milk test came into general use many of our best farmers did not know the relative values of their own cows. Now the poor cows are weeded out, and only the progeny of those with a good record kept for breeding purposes.

2. More attention is being paid in the feeding of animals, and to proper combinations of food. Balanced rations are better understood, and such terms as "albuminoids," "carbohydrates," are now condensed plain English.

3. Canadian bacon is well and favorably known on the British market, where five years ago it was practically unknown. Last winter this subject was discussed at more than 700 Institute meetings in Ontario. The pork packers assure us that the farmers are sending in a better class of hogs each year, and that the improvement is particularly marked this fall.

4. A more intelligent idea of the subject of cultivation is manifest. There is a better understanding of the soil and its needs. Green manuring is resorted to. Underdraining is more generally practiced.

5. Weeds, insects, and birds are being studied. As evidence of this the Department of Agriculture is about to publish a second edition of Mr. C. W. Nash's Bird bulletin, and the call for Prof. F. C. Harrison's bulletin on Weeds has been very great. Rural school teachers and county school inspectors are continually writing for extra copies for their teachers and their scholars.

6. Canadian fruits are appreciated abroad as never before, and our Institute delegates inform me that in many places the discussions on this subject are so popular and the farmers so eager and enthusiastic, that many afternoon meetings are protracted almost into the night.

In conclusion, allow me to read two short paragraphs from a Saturday newspaper which refers to the development of Canada in the following terms: "Mr. J. W. Flavelle, in his speech before the Canadian Club on Friday night last, drew attention to three remarkable facts illustrative of Canada's great development since Confederation. He pointed out that to-day Canada's total trade had risen to a volume equal to that of Great Britain's total trade in 1820—just about two generations ago; that in per capita trade Canada ranks second only to Great Britain among the great nations of the world; that our wealth as represented by the savings of the people has increased 700 per cent. in the last twenty years; and finally, that a second transcontinental line of railway is already in course of construction by a private company.

"And this has happened in twenty years. A vision of what the next generation will see in Canada might unfold a development fully as wonderful as that which has transformed Great Britain and the United States during the last generation into the two great commercial and industrial powers of the world."

At the close of Mr. Creelman's address, each of the following Institute workers spoke for five minutes on the subject of Farmers' Institutes: H. Glendinning, Manilla; Andrew Elliott, Galt; G. C. Caston, Craighurst; T. G. Raynor, Rosehall; A. W. Peart, Burlington; A. McNeill, Walkerton; C. W. Nash, Toronto; T. H. Mason, Straffordville; J. E. Orr, Fruitland; Maj. James Shepherd, Queenston; R. S. Stevenson, Ancaster; and James McEwing, Drayton. At the request of the Superintendent of Farmers' Institutes, the report on this discussion is to be embodied in the next annual report of the Farmers' Institutes of Ontario.

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THE EX-STUDENTS OF THE AGRICULTURAL COLLEGE.

BY PROF. J. B. REYNOLDS, AGRICULTURAL COLLEGE, GUELPH, ONT.

We read of an ancient people, who, by various circumstances, were scattered over the wide earth, losing their national entity, but preserving their national pride and zeal. Their thoughts on all occasions reverted to the old land; their centre of worship was still the old city. Thither once a year the more earnest and devoted among them repaired to worship according to the customs of their forefathers, and to commune, as time would permit, with the other zealots of their nation. I imagine that it was not gain, nor hope of prosperity, that so attracted them to the old city of their forefathers. It was some higher ideal, some noble aspiration, some lofty longing, which drew them back as an invisible but irresistible force to the old place. It is my fancy this evening to liken the ex-students of this College to that old people. They are scattered far and wide over this earth, but far and wide though they may be scattered, we have had abundant evidence of the fact that wherever they may be their thoughts turn once a year to this place as the temple of their educational life, and to this place they turn their steps once a year to engage in the feast of reason and flow of soul; and in this place they are found, the more earnest and sincere and devoted among them, as often as circumstances will allow; and we are glad on that account to welcome them to this the Jerusalem of their educational life. And it is a matter of gratification that so many ex-students find the desire in their heart year by year to return to this place. It is, I believe, a proof of the fact that the commercial spirit, which is so wide-spread to day, and which finds its expression in all avenues and departments of life, does not rule us all in the stronger and better part of our nature. There are impulses amongst our ex-students bringing them back here which are not due to the commercial spirit. An occasion of this kind remains with them throughout the year as the one delightful part of their home coming. I do not wish to disparage in any way the work of the day, nor to detract in any sense from the great value, the great commercial value, of the experimental work carried on by ex-students and others; that is not my point, but I believe you will all agree with me in saying that there are things in a man's life, in a man's endeavor, which are greater and grander and nobler than the mere commercialism of our fleeting existence. We may be commercial men, we may be guided very largely in the great majority of our thoughts and endeavors by the commercial spirit, and yet that is not the paramount principle in our lives. That is true of our ex-students, and I am very glad to be able to say it of them, and their annual coming to this place is a proof of that fact.

It is well understood that the work of this institution is largely, principally, to educate farmers, but it is a good thing for our ex-students, as well as for this country, that this institution has been able to cause some of those ex-students to see that they were not intended to be farmers. And, therefore, over the length and breadth of this country some of our best known and most successful students are not farmers. Whether they learned it here or not I am not prepared to say. Although they at one time directed their attention to agriculture as possibly their life work, they have learned that in some way that was not to be their work. And, therefore, I say we have ex-students who are in various departments of work in this country. I was glad to learn only yesterday that one of our ex-students, who had left here with every intention so far as he knew, so far as we knew, of following agriculture, is now a student in Chicago preparing to be a medical missionary, and I learned also that he had received his inspiration towards that at this place. I am glad on behalf of this institution, on behalf of the relation it bears to this country, and the ex-students of this country, that we can in the various departments of our activities here give such inspirations and promptings. I am not saying this now for self-glorification in any sense, but am glad to notice that our ex-students are receiving impulses towards development of character and towards the choice of a noble calling. We are always concerned to know that our ex-students are following their bent. It is a very sorry thing to find a man a misfit. We have tried here to deal honestly with our ex-students in this respect, and if they are not evidently fitted to be farmers we want them to see it as far as they are able to do so. It is not in any way a disparagement to those ex-students who have not followed agriculture that I speak thus, but there is a higher and nobler consideration than the mere choice of calling, and that is that our students shall

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be *men*, shall be men of lofty ideals, shall be men of noble aspirations. Emerson has said, "Hitch your waggon to a star." I do not know that it is the highest and best wish for a man that he may attain his ideal, because if that man attain his ideal that ideal is necessarily low. If you hitch your waggon to a star you set up ideals which are inspiring but unattainable.

Did ever on painter's canvas live
  The power of his fancy's dream?
Did ever poet's pen achieve
  Fruition of his theme?

Did marble ever take the life
  That the sculptor's soul conceived?
Or ambition win in passion's strife
  What its glowing hopes believed?

Did ever racer's eager feet
  Rest as he reached the goal,
Deeming the prize achieved was meet
  To satisfy his soul?

UNIVERSITY EXTENSION WORK ALONG NATURAL AND RURAL LINES.

By Prof. I. P. Roberts, Cornell University, Ithaca, N.Y., U.S.A.

If I read history rightly, the first Agricultural Society organized in Upper Canada was in 1792, more than a century ago, and the first farmers' reading course, either in the United States or Canada, was outlined by President James Mills of the Ontario Agricultural College in 1882.

I think you have a right to be proud of these facts. Certainly your people are in full sympathy with the industrial classes, and early made intelligent efforts to help them. In these later years we in the States have tried to follow the road you blazed through the wilderness in the early years. Benefited by your experience, the New York Agricultural College has, in many ways, tried to reach the farmers and, of late years, the farmers' children. The work done by our College throughout the State is sometimes known as "University Extension Work" and one branch of our work particularly as "Nature-Study."

To get a clear understanding of how the work in Nature Study and University Extension started at Cornell University, it will be necessary to give a brief history of the rise and progress of this work which now extends into all parts of the State.

In the fall of 1893 a few lectures were given by the members of the Faculty of Agriculture in the fruit districts of Western New York. The fruit-growers of Chautauqua County became much interested, and wanted to know why this work could not be extended. The answer was that it could be if funds were provided for travelling expenses and for employing more experts. Early in 1894 the farmers of this county, through Assemblyman S. F. Nixon of Westfield, secured an appropriation of $8 000 "for the promotion of horticulture by the College of Agriculture in the fifth judicial district," which embraced sixteen counties in the western part of the State. The next year, 1895, without any effort on the part of the College, an appropriation of $16,000 was secured to continue the work, which was more extended and embraced twenty-two western counties. In 1896 the farmers again went to the Legislature and an appropriation of $16 000 was made for carrying on this work. In 1897 the appropriation was increased to $25,000, and the scope of the work was somewhat enlarged, and embraced both horticulture and general agriculture throughout the entire state with the exception of Long Island. The State Station at Geneva had at that time established a sub-station on the island. In 1898 $35,000 was appropriated for this work. In 1899 an appropriation of $35 000 was again secured. This appropriation ended on May 1st, 1900. Then an appropriation of $10.000 was secured for carrying on the work from May 1st, 1900, to October 1st, 1900, when the appropriation of $35,000 was made available for carrying on the work until October 1st, 1901.

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This movement is unique in that the appropriations have all been secured by the spontaneous action of the farmers of the State. It will now be in order to show how the Nature-Study work grew up out of these various appropriations which were originally made for horticulture in the western part of the State, and finally for horticulture and agriculture throughout the entire State, with the exception mentioned, and finally the bill was so drawn that it was more of the character of an educational bill, specifying that the appropriation was made for the "promotion of agricultural knowledge throughout the State."

You will notice that the term is a very broad one. We attempted, in the early years to hold schools of horticulture and agriculture at various points, and extending through about one week. There was no difficulty in getting from 30 to 40 regular pupils at the forenoon, afternoon and evening sessions, but these pupils were largely mature or old men, and after a year or two we came to the conclusion that we had begun, in part at least, at the wrong end of the problem. Our attention was then called to the lack of any adequate instruction in our schools in what, for want of a better name, we finally came to call "Nature-Study," which we broadly interpret to mean a study of the visible things, especially those related to agriculture and horticulture, by which the pupils were surrounded.

Our first effort was to introduce this work into the Teachers' Institutes. We were not received enthusiastically and it was nearly a year before the persons in charge of these Teachers' Institutes appreciated what we were trying to do. After we had secured a place for our instructors at these institutes, it again dawned upon us that we had not succeeded in reaching, as directly as we desired, the school children of the State.

An effort was then made to get into the schools and before the pupils. We found that the country school teacher took little interest in the work, and that the pupils, because of their youth and the small number which were gathered together, took still less interest. That is to say, we could get up no real enthusiasm—could not create a desire for knowledge along the lines of our work. From the country districts we went before the schools in the villages. Here we immediately found appreciative teachers and appreciative audiences. We soon saw that we could not employ enough reliable experts to reach the 1,204,000 school children of the State.

Our experience had taught us much, and we began to see that something might be done by sending out literature. A few modest leaflets were printed and sent out, some to the teachers and some to the pupils. These were so kindly received, and there was such a great demand for them, that many of them went to the fourth and fifth editions. We found also that there were many teachers who would like to be taught. They had become, not only interested in our efforts to give instruction to the children in those natural objects which relate directly or indirectly to the farm, but they expressed a desire to come to the University and be taught. Of course if a school of Nature-Study was to be established for teachers, the term must be during the summer vacation of the teachers. It was a delicate venture which we made, because during much of the summer Teachers' Institutes were being held, notably at Chautauqua and Thousand Island Park. If the College offered a course in Nature-study at Cornell University at the same time, it was feared that it would draw the teachers from these two great centres and injure the regular summer work carried on by the Superintendent of Education of the State. It was finally satisfactorily arranged by providing for the teachers a course at Chautauqua and also at the Thousand Islands.

Two years ago we sent out a circular advertising that a Summer School in Nature-Study of six weeks would be held at Cornell University, and that the subjects taught would be Nature-Study—in Plant Life, in Insect Life, and On the Farm. In less than two months over one hundred had applied for admission to this course. On account of limited facilities we could admit but one hundred students. Before our limited facilities were fully known three hundred teachers had applied, largely from New York State, although several adjoining states were represented, but those residing outside of the State were required to pay tuition. This school was continued the following year, and there were some one hundred in attendance. Over two hundred applications had been made for admission, although it had become generally known that one hundred students were all that could be accommodated.

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We have now, in brief, the outline of the work in Nature-Study as related to the teachers of the State. Before passing on to another phase of this subject, I may say that it had been decided that we were not reaching the farming community as directly as we desired to. A large proportion of these teachers came from the cities, and the school children of the villages and the country were left, by this effort, to some extent uncared for. Simultaneous with this movement which I have just described, other efforts were made to reach the farmer and his children more directly than he was being reached by the instruction which we were giving to the teachers who came to the University for the summer term.

This extension of agricultural knowledge, by reason of the State appropriations which have been set forth above, has taken on two rather distinct lines of work. The first consists largely in conducting investigations in co-operation with the farmers of the State. One or more experts are kept in the field for about six months of the year helping the farmers to investigate for themselves. These investigations have been first, the testing of soils through the application of fertilizers, and second, tillage experiments. Both the tillage and fertilizer investigations consisted of planting various crops on measured areas of ground which were either treated with fertilizers or given superior tillage. These experiments have been conducted largely along the lines of sugar beet, potato, been and corn culture, and the object of the teacher in the field was not fully attained until he taught the farmers that he was to study these natural objects (farm crops) with which he had to do.

We tried to make it more than a simple experiment—that is, instructive in every way. In all, about 5,490 experimental plats have been under our inspection and charge away from the University and 1,645 farmers have co-operated in the work. The number of experimenters and experimental plats embraced under the extension work from 1897 to 1900 is as follows :—

	Experimenters.	Experimental Plats.
1897.		
Sugar beets	495	495
Strawberries	5	23
Fertilizer	137	1096
	637	1614
1898		
Sugar Beets	438	600
Strawberries	3	11
Fertilizers	100	800
	541	1411
1899		
Sugar Beets	71	295
Strawberries	3	30
Celery	1	10
Fertilizer	65	480
Beans	17	200
Potatoes	120	240
	277	1255
1900		
Sugar Beets	44	273
Strawberries	3	30
Celery	1	1
Fertilizers	50	400
Beans	32	380
Potatoes	59	118
Special	1	8
	190	1210
Total for 4 years	1645	5490
Yearly Average	411	1372

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All who received seeds did not actually conduct experiments which were of value.

Farmers' Reading Course. We found that the farmers were not reading enough and so a Farmers' Reading Course was established outlined as follows:

1st year. The Soil and the Plant.
2nd. " The Animal and How to Feed it.
3rd. " The Orchard and How to Grow it.
4th. " Winter Course at Cornell.

There are now more than 20,000 farmers registered in this course and 1,200 farmers' wives have requested that a course be mapped out for them in Domestic Economy similar to that now carried on for the farmers. During the last year 175,000 pages of instructional matter and 20,000 circulars and circular letters have been sent to the Farmers' Reading Course Students.

Teachers' Leaflets. During the years the leaflets on Nature-Study have been somewhat modified, and are now issued at regular intervals in the form of a quarterly. Four editions of these quarterlies, containing 280,000 pages of printed matter, have been sent out during the year.

Junior Naturalist Clubs. In order to reach the pupils of the schools more directly than we have been doing Junior Naturalist Clubs were organized and there are now registered in these clubs 35,000 school children which of course requires that each publication for these clubs shall be an edition of 35,000 plus the demand that is made upon us from teachers in other states for sample copies.

Home Nature-Study. The Home Nature-Study Course is a correspondence course designed exclusively for teachers and numbers some 2,500 members.

You can well understand that to carry on this work successfully requires several experts as managers, and half a dozen clerks, stenographers, etc.

We still continue to send lecturers to the Teachers' Institutes. About fifty lectures were given last year besides employing three lecturers to speak on Nature-Study before the Teachers's Institutes at Chautauqua and Thousand Island Park. It is estimated that during the year 30,000 persons have received instruction by means of these and other lectures which have been given under the auspices of what is called "Nature-Study Work," but would better be called "University Extension Work for the Promotion of Agriculture."

I must now leave it to you to decide as to the value of the plan of the work and as to its efficiency. We still believe that in many respects the work can be greatly improved, and we have made the three months' Winter Course in Agriculture a part of the Farmers' Reading Course. The object has been to get the farmers, both young and old, interested, and to get them to read and study at home, and now we are making an effort to induce the sons of farmers to come up to the University and receive personal instruction in the class-room for three months.

ADDRESS.

BY HON. JOHN DRYDEN, MINISTER OF AGRICULTURE, TORONTO, ONT

I am very grateful indeed to Dr. Mills for the kind words he has uttered in reference to myself. I would not deny anywhere in this country that I have had always a deep interest in the welfare of this institution. I have applied for a better equipment, I have applied earnestly for increased and enlarged departments at this institution, and with what success let the President and officers tell you. We have had success in this regard, and the equipment and the attainment of the departments has been such that Dr. Mills is able to say to you, after a visit to the old land, that this institution is now in these respects as well equipped as any in the world. I was very glad to hear him make that remark. I have taken this interest in this institution, because I believe it has a place and will have a power in the development of agriculture in this Province and in this Dominion. What that interest will be will depend upon these young gentlemen to my right and left, who are here to-day, with the others who have left the institution before. It will depend somewhat on what these young men will do, using the opportunities placed within their reach to equip themselves for the work in hand. We have

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seen some of our college boys go away to South Africa, and we are sorry for what has happened to some of them there, but I want to say that these boys in Africa, by their bravery and their pluck, have won a prestige for every one of us who is known by the name "Canadian." The whole world knows Canada better now because her soldiers went to South Africa to fight for Her Gracious Majesty the Queen. While I say that, I would like the young men to remember, I would like the officers to remember, and our visitors to remember, that while some of our lads were away in Africa, we have had another set of boys working away at home, engaged in another sort of battle, but all the same a true battle. We, in this country to-day, battle with the whole world for the right to the best markets in the world. We want to win for Canada in this regard just the same prestige our boys have won for us in Africa, and I believe we can do it. Where are we to get it? We need the best men to accomplish this work; we need that these best men should be well trained; we need that they should be banded together; and where, I ask, Mr. President, are we to have them trained in Canada except at the Ontario Agricultural College? Whether the young men will take advantage of their opportunities as I have said is for them to say. Will the boys be offended if I do say that there are some things all students are apt to forget? Perhaps there are a good many, but there are some things all students are apt to forget. They forget that every day brings with it its own opportunity. To them life looks a long distance ahead; there is lots of time, lots of chances; "what I don't do to-day I can do to-morrow." The student never made a greater mistake than that in his life. To-morrow has its own lessons, and to-morrow brings its own opportunities; and therefore if you let to-day's opportunities pass you will never have those opportunities again. The boys try to make it up by a system of what they call "plugging." I don't believe the boys do the best for themselves if they leave all the work to the last. You had better seize the opportunity of to-day; start in at the beginning, and use up your time to the best advantage as you go along and you will find you have the best success. How often do I hear young men say, "If I only had my time to live over again." You can never have the chance, and there are some of us with grey heads to-day who feel we are not what we ought to be simply because we have missed our chance. Students do not understand that they are missing these opportunities every day. Let me say another thing, that character in this world counts for influence. Notice what I say, that character counts for influence; and they forget that a young man makes his own reputation, and he is making it every day he lives. He does not know it. He says, "Nobody sees me, nobody notices it", but he is making a reputation for himself, and the little things he does go to form his character, and that gives him influence one way or the other. How often do you hear, "Oh, he is a very nice lad, but he is a little mean", or he is a liar, or he is lazy. You need to be careful; little things make up a man's life; little things make a man's character. Character gives you influence. Let me suggest another thing. Do not forget that the best lesson you can learn is the power of self-control. If I have any advice to give, it is to get hold of yourself and control yourself, and use your power where it can be used to the greatest advantage. I had the privilege of presenting a prize to one of the boys here, and last year another one, and he has since won a prize in Toronto (cheers); he swept the whole country. I said, "I saw you running, not merely using your limbs, but I saw you using your brains in that race, and you had yourself under control". Some of us who were a little ignorant thought he would never catch up, but when the time came he had himself under control, and he came out ahead. One of the best lessons the students can learn if they are to be useful in after life, is to have themselves under control. We all have passions, but you cannot do your best unless you can bring yourself, as Mr. Hallman did in the race, entirely under control. You must remember that other people have rights as well as yourself. You must remember that you are to be a part of society. You must remember that you cannot always have your own way. You must try to live for your country, and not altogether for yourself, and then you will have power and influence. Now, let me say that there is no greater need in the world to-day anywhere—in the United States, or Canada, or anywhere else the world over—no greater need exists than the need of men. That is the greatest need of the age. You go among the business men; they want leaders in the business world. Here is an industrial institution, they want men. Here is an Insurance Company, they want men. We, in politics, are looking for men all the time. The world needs men, and where do we expect that these bright, useful men are to come

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from more than from our own Agricultural College? Remember as you are at your studies that you are fitting yourselves to be men of the highest type, and to take some of the highest places. I asked Dr. Mills the question, how many Ministers of Agriculture he thought he had in his College. I expect there are quite a number. I like to look at a lot of young lads, and think what they are going to be in after life. I am looking for somebody upon whom my mantle as Minister of Agriculture will fall. I hope it will be on some ex-student of this Agricultural College. Nothing would delight me more than to have it so. I have nothing but good wishes for this institution. I have faithfully endeavored to serve this institution in the past. I have tried to keep it out of the political arena. I think it never ought to be in politics. I think it an outrage that it should be a political football; it is an educational institution of the best and highest type, and well worthy of all our people, Grit or Tory or Independent, or whatever they may call themselves. I trust, therefore, that that day is past, and I believe it is. We have in the Legislature, sitting opposite to me, an ex-student of this institution. I am glad he is there, and I believe he will influence the members on that side to leave it alone. I believe he is interested with me in trying to build it up, and give it power and influence in this country. Let it become an unpopular thing in this country to drag an institution of the type of our own Agricultural College into politics. I thank you for your kindness.

ADDRESS.

By Hon. L. P. Farris, Commissioner of Agriculture, New Brunswick.

It gives me great pleasure to be here to-night. I may say that when we started up here we expected a good reception from the people of Guelph, but it has far exceeded our expectation. We have had a most delightful time; we have enjoyed your entertainments. We were at the College yesterday and last evening; and I may say for the people of New Brunswick and the Maritime Provinces that we were all delighted. While we are not so far advanced in agriculture as you are here, yet we are making rapid strides in the right direction, and we do not propose to let you get too far ahead of us, and while we are nearer to the greater markets of the world than you are, we hope to hold our own with you in regard to exports. I regret very much that some legislator of oratorical ability from the Province of New Brunswick is not here. I am not in the Legislature for my *speaking* qualities; I am simply one of the *workers* of the Government. You are fortunate here in Ontario in having both a worker and a speaker at the head of the Department of Agriculture. I was delighted with the speech of the Hon. Mr. Dryden. We hope to profit by our trip up here. We know these visits will do us good, and we hope to take new ideas back to our people down there. We hope you will come back to us sometime, because we are hinting at starting a college in the three Provinces to rival yours. We do not know whether we will succeed or not, but in the meantime we are sending all the students we can up here to Guelph.

BRIEF REFERENCES TO THE AGRICULTURE OF THE MARITIME PROVINCES.

W. W. Hubbard, Editor of the *Co-operative Farmer*, Sussex, N. B.: I think we must congratulate you very sincerely upon the progress you have made. I know that the ex-students of this College in the Maritime Provinces feel a loyalty to this institution. Some of us were here as students in its early days, when it was not equipped as it is at present, still there was that general feeling among the staff of the institution which enabled them to inspire in the students of those days some of the sentiments which I hope all of us have partaken of, and which have made many better citizens of the country than they would have been had it not been for their college training. Speaking for one moment of the extreme eastern end of this Canada of ours, I see a very marked change in the estimation in which we are held down there during the last fifteen years. When I came up here, New Brunswick especially, of the three Provinces, seemed to be

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very little known. People would say, "Oh, yes, you have some spruce logs down there and some excellent herring," and it was deemed incredible that there was any agriculture. I couldn't blame the people of Ontario at that time for their opinion of the Maritime Provinces. We hadn't, up to within the last quarter of a century, at any rate, done our duty by our country so far as agriculture is concerned. And while I do not know that we should hold second place to any in the quality of the men and women we have there, because they have made very marked success when they went abroad; I think they have held their own in the Parliament of Canada and other places. Still, we have not given our attention to agriculture, because we have had so many other resources claiming our attention. The spruce logs have claimed a good deal of attention from our people; they have made a good deal of wealth for them, and consequently the farms were neglected. I am happy to say that a change has taken place. While at that time there was a considerable feeling that the Maritime Provinces did not amount to much, and that we down there were not in hearty sympathy with the people of the west, it arose in this way, I think. Of course, we are a country of magnificent distances, and when our railways were put through we were busy lumbering, ship-building, and various other things. We had pretty good markets for our stock, farmers were getting fairly good prices, but when the railways were put through, what did we find? The people of Ontario had turned their attention to agriculture and were securing the very best markets. I should perhaps say here that our visit in such large numbers at this time is due largely to a gentleman with whom you are well acquainted, our friend, Mr. Hodson, and I hope that his efforts in his present important position will greatly assist us in the far East, to organize our farmers as your farmers are now organized in Ontario.

F. L. Hazard, Charlottetown, P. E. I.: We have had a few students coming up from the Maritime Provinces and receiving their education here, and going back and inducing and enthusing our people in the matter of agricultural pursuits. And the time has now come when agriculture has become very different in the ideas of the people to what it was years ago. There was a time in my recollection when a man was almost ashamed to stand up and say he was a farmer; he looked on his business to a certain extent as a menial one; but happily that time has gone by. I have very much pleasure in saying that the time has come when it is not the dull boy, and the stupid one, who is to become the agriculturist, but it is generally conceded that it must be the brightest one of the family. In our own Province we have had some very capital illustrations of the good effects of your College with us; and I can say this, that the seed which was sown by these gentlemen in the minds of many of our people, the bread that was cast on the waters some 10 or 12 years ago, is now about to bear fruit. Our Province for the first time in its history will probably in the course of a few weeks have a Department of Agriculture. This is a step in the right direction; we look on it as one of the progressive features of the Maritime Provinces; and while we lagged behind the time has now come when we, as well as the other Provinces, are about to have a Commissioner of Agriculture. I know it would be useless for me to take up your time, and I will not detain you longer, any more than to express my extreme pleasure at being here on this occasion on my own behalf and on behalf of my friends. There is one idea I wish to express, and that is the very good fortune this Province has in having such a Minister of Agriculture as we are honored by having with us here this evening, I mean the Hon. Mr. Dryden. Mr. Dryden at great personal sacrifice of time and almost in danger of his life, visited our Province a few days ago, at a stormy season, when it was very difficult to reach us, and I think he made an impression on our people which will be lasting and will bear good fruit.

E. B. Elderkin, President of the Maritime Stock Breeders' Association, Amherst, N. S.: The question may naturally arise in your minds why are we here and what are we here for? We are here because, away down in the Maritime Provinces, we have heard of the Guelph Agricultural College; we heard of it years ago, and some of our boys have been coming up here and bringing back grand reports of the wonderfully good things you had up here, and we have been having some of your professors coming down that way. Our friends, Dr. Reed, and Prof. Day, have been telling us wonderful things you have up here, and we wanted to verify their statements. Then we have had Dr. Mills himself, and there is another gentleman, who has come down and done more to interest the Maritime Provinces in Ontario than any other, a gentleman I believe well-known to you all, esteemed and respected by you all, and who to-night is banqueting in eternal sunlight.

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I refer to Mr. John I. Hobson. He came down to us four years ago, and delivered a number of addresses there, and I wish to say here and now that there is no man I know of who has ever visited the Maritime Provinces who has done so much to awaken an interest in advanced agriculture as did the late John I. Hobson. Since that time we have had Dr. Mills down there two years ago, the Hon. John Dryden this last year, and F. W. Hodson and a number of others have come down that way. We feel that if there is any good thing on earth we have a right to it, and so we have come up here to see what you have, and we are going to take away anything that is loose; we are going to appropriate it to our own use, and we are going to see what we can do down there. I want to say that the influences of the Guelph College have gone from one extreme of the Dominion of Canada to the other, that they have awakened ambitions in the minds of the people all over this Dominion, and that we to day down in the Maritime Provinces are laying plans for something just on the line that you have here; but this Canada of ours must be one. I believe that the barriers are broken down never to be raised again. I believe that while we have had these sectional feelings in the past, that they are gone and gone forever. We, from Ontario, Quebec or the Maritime Provinces, as Canadians, now have it in our hands to place this Dominion of Canada before the civilized world, and it can only be done by such lessons as are taught in your Agricultural College. I was proud to-night when I heard some of you say that it was from these ranks that the legislators come, and the judges and the professional men. It is true, and when the Hon. John Dryden asked how many Ministers of Agriculture were present in this audience to-night I could not help thinking that right here are the men of to-morrow. The boys of to-night are the men of to-morrow, that are going to make Canada's greatness, just as sure as you are sitting in this room. I wish again to thank you for your kindness, one and all. We may never have the opportunity again, but we wish to thank you for your kindness, for the reception you gave us yesterday, and at this meeting here at your College this evening, and to ask you to come down to the Maritime Provinces, and we will try to show you what we Bluenoses can do.

THE HOUSE BEAUTIFUL IS THE HOUSE HEALTHFUL.

BY ELLEN H. RICHARDS, INSTRUCTOR IN SANITARY CHEMISTRY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

The architect will not build for us the 20th Century house until we ask it of him. We do not know what to ask for until we have studied the problem of modern living; have found out its requirements, its limitations and, especially, its possibilities. The house seems to have been evolved from the cave and rude skin tent because of the need for shelter from changes of weather and for protection of the young from danger. These, primary purposes the house must still serve no matter how much more in the way of size and form and color and adornment is added.

The development of the modern house has been along two lines—that of economical construction for the size and appearance, and that of artistic adaptation to the surroundings and supposed taste of the occupants. In both these directions sanitation is often neglected. For economy's sake, rooms are made too small with only one window, and dark closets with rough floors which catch and hold the dust, are too frequently crowded under the one roof with consequent dangers. For making an impression on the passerby jigsaw ornamentation and false windows and chimneys used up the money which should have made the back premises more wholesome.

But probably more sanitary sins are committed through the struggle to make a fine looking exterior without regard to the interior. The architect and builder looks at the house from the outside and sees only the superficial actions of daily life. He plans and builds as if this were a toy construction, not a workable machine. Just as the carpenter always puts the hooks in the closet just out of reach, and the closet shelf so that the housewife must climb into a chair to see what is on it, or to see if it is clean, so the builder provides an empty house. On furnishing, the chambers have no place for the bed, the parlor is too small for the piano; in the dining room the pantry door cannot be opened when guests are at the table; the living room windows open on a dusty street

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instead of on the garden; the kitchen sink is in the darkest corner and the stove farthest away from the dining table. One has to keep trunks down cellar and table linen in the second story, and very often any dark place which can only be lighted by gas and which is not fit for anything else is used for the plumbing. The centre of the house is safest from freezing and therefore no attention is given to the ventilation. The furnace is too small and has to be driven so that eggs will cook over the register; one room is overheated, the halls are cold. Alas, how few of us live in the perfect house, fitting our needs as a garment, and like it snug enough for warmth, and yet loose enough for comfort—sweet and clean and altogether desirable. Why are there so many misfits? Partly because women have not studied architecture, and partly because we have not, as a rule, paid sufficient attention to the various elements which go make up both the aesthetic and the sanitary qualities of our homes We have still much of the inertia of the savage. We carried plumbing into each sleeping room to save steps; we neglected to see that the pipes were accessible to sight and not to rats; that traps and vents carried the foul air out of doors and not to the children's cots. We cared more for looks than safety, and so boxed in all our wash basins and kitchen sinks. We had an aesthetic yearning for dim, religious light and covered our windows with heavy draperies, our floors with thick carpets nailed to the floor, and thought once a year sufficient for house cleaning; we took no warning from the shovelfuls of dirt we got out from under heavy furniture and dark corners; we attributed the headaches and sore throats we got to the use of air tight stoves or to anything else, even to our mothers' and our grandmothers', but never to our own, faults. We even overlooked the sink drain, and had it close to the well, yes, and used the well as a cold pantry—all for lack of attention to details and careful thought as to health.

There is stirring in even the savage breast a desire for decoration, and it grows stronger with race development, but a restraint in the use of decoration for the sake of health belongs to a high condition of civilization such as we claim to possess. Beauty means utility, adaptation of means to ends, simplicity so that each individual part stands for itself and yet is in harmony with the whole.

The house beautiful has, first, air space around it and in it—clean air not tainted with decaying vegetation or stagnant water—sunlight on roof and two sides even to the soil; shade trees not too close or thick, other buildings not too near or too high; sunlight in the rooms not kept out by blinds or heavy curtains; the colors of carpets, etc., chosen to bear this light for the sake of the sterilizing power of sunshine. The Ralstonite's elixir of life is glame—air in motion vivified by sunlight. All rooms of the house beautiful have either windows on two sides, or a door opening into a space which communicates with outer air for quick renewal of the room air by a cross current, and are so furnished as to retain as little dust as possible. In short, the new house beautiful fulfils all the requirements of sanitation and comfort.

DRESS, ITS HEALTH INFLUENCE AND BEAUTY.

By Miss Laura Rose, Guelph, Ont.

Three thousand years ago David said, "I will praise thee for I am fearfully and wonderfully made; marvellous are thy works, and that my soul knoweth right well." When we consider the wonderful mechanism of this machine which we call the human body, and let us for a moment see just how wonderful it is—we call to mind a picture. A young lady sits before an open hearth. She can feel the rays and warm air coming to her; she can inhale the perfume and admire the beauty of a bouquet of roses on the table before her, and at the same time enjoy the juicy tartness of an apple, while from an open door of the music room there floats the strains of some familiar lullaby that calls her back to her mother's knee. She can do all this within the same moment. Isn't that a wonderful being? Then, if it is so marvellous, so wonderful, is it not right and proper that we should give time and consideration to the proper housing of such a creation? I think it is. We should dress according to our means and circumstances with an aim at refinement and elegance rather than fashion and show. I like that distinction, let our aim in dress be at refinement and elegance rather than fashion and show. The position we occupy in society and the length of our purse, although these are not always consid-

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ered, should to a large extent determine our dress. It is not called for for some people to spend nearly as much money as others on their toilet. The demands made upon them in society, the position they occupy, does not demand that they should be so elaborately dressed. It is a duty we owe ourselves and our friends that we should be at leat neatly and respectably dressed. In this day it is the duty of a person not to bring upon herself or her friends unjust criticism, or probably it may be just criticism, with regard to one's toilet. The great consideration of dress should be to adapt it to one's health and comfort, to make it suitable to the means and station, and pleasing to the eye. Ugliness is neither necessary nor natural. Prettiness in dress depends more on color and shape and fit than on ornament, trimmings or buttons.

Let all the organs of the body have room to perform their functions. Do not by suppression so cramp or displace them as to unfit them for the functions their Creator intended them to perform. Here is an illustration. Lord Shelburne was standing by a celebrated sculptor when Lady Hamilton entered the room. Tall, well-bred and graceful she glided across the carpet. Turning to the sculptor Lord Shelburne said, "Is not Lady Hamilton a superb figure?" The sculptor turned, and after a moment's hesitation said, "Yes, I suppose she is, but I was just wondering where her liver was." The sculptor knew the anatomy of the body, and he knew the displacement that must of necessity have taken place within. Then let us see things from the sculptor's standpoint, which also is the standpoint of health. Our natural and physical natures are largely influenced by the clothes we wear. A woman looks better and acts better when conscious of the fact that she is suitably dressed. Some lady has said that the sense of being well and suitably dressed imparts an inward tranquility which religion itself is incapable of bestowing. You may be at church listening to the most eloquent sermon, but if you are conscious that your waist and your skirt have parted company, or that your collar has slipped from its place at the back, I am afraid that all the inspiration the minister may enthuse into his sermon cannot make you feel comfortable under those conditions. A good and beautiful woman is the highest work of art.

There was a lady who was very melancholy. She was under the doctor's care for a long time, but he seemed incapable of getting at the seat of the trouble. At last he said to her one day, "Mrs. A., when did you get a new dress?" She looked at him in surprise; a queer question for a physician to ask. "Oh, you know," she says, "Doctor, I have been in poor health for such a long time that I do not know when I got a new dress. There is no use in my getting a new dress, I am getting worse every day." "I'll tell you what I want you to do," said he, "Get a cherry red tea-gown. Have the dressmaker in the house to make it." She thought that was the queerest medicine she ever had had prescribed, but she was in the habit of following the doctor's orders, and she followed them in this. She had the gown made, and put it on, and went to the glass. She was rather surprised at her appearance in the glass. She had not curled her hair for months, but thought it must be in keeping with the gown, and so she went and curled her hair, and did it up high on her head. She then walked around the house in a way she hadn't done for a year. Her husband came in and said, "Why, my dear, what is the matter, you look five years younger?" She straightened her back a little stiffer and walked around with greater dignity, and from that day the woman's health began to improve and did improve, and it was all attributed to the red teagown. Because a person is getting old, they need not think they ought to wear dark clothes. For the street, it may be better, but for the house find out the most becoming color, and have a nice house waist made out of it, and see if your husband or sons or brothers will not pass some complimentary remark that will make your eye brighter and your step lighter. Then, on a rainy day we say to ourselves "Oh, nobody will call this afternoon, it is so wet and rainy I need not tidy up." If there is one day in the year you should take a little pains to your dress it is that day. It may not be elaborate, but put on a bit of ribbon to make sunshine in the house. It is the woman who makes the house attractive and has some appetizing dish on a cold, damp day who has her husband falling in love with her over again.

"We have careful words for the stranger,
And smiles for the sometime guest,
But oft for our own the bitter tone,
Though we love our own the best."

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I wish you could all learn that little verse. We should not keep our best for the stranger, for the sometime guest, but we should take a little care to please the dear ones who are ever with us, the ones we love the best. To speak more definitely with regard to what we should wear. The underwear should be soft and warm. Combination suits are admirable, reaching from the wrists to the ankles and the neck, affording equal warmth to all parts of the body and doing away with unnecessary band or bulk around the waist. I think in this changeable climate it would be well if the ladies could wear some thin woollen goods all the year round next to the skin. I feel sure there would not be nearly as many colds. A person accustoming themselves to thin wool or silk and wool underwear does not find it more cumbersome than the linen or silk. The underskirts should be short and as much as possible suspended from the shoulders. All of the weight of our clothes should come from the shoulders instead of from the hips. We would be less tired if this could be so. I emphasize most emphatically that underskirts should be short, and that the outside skirts, especially for walking, should be short. I think that long skirts in this day of civilization are a menace to us. When we consider them not only from a hygienic standpoint, but that of convenience, and also of cleanliness, I think the long skirt is a menace to our civilization. They have a place probably in the drawing room, but on the street, made of heavy cloth, they are not at all desirable. We have seen probably a quaint old lady going with short skirts, and perhaps wearing very comfortable wraps, and we considered them old-fashioned. Let me say this same old lady may have a far keener intellect, and be freer from care than we who follow the fashion.

I have often wondered who and where this Mrs Dame Fashion lives. I have never been able to find out who dictates what we should wear, and I think we, as women, should learn to shun that which is foolish. Take that which is beautiful and becoming, but also that which best promotes our own health and comfort. That should be our standard with regard to dress. For kitchen wear, the skirts should be short and the dress as much as possible of washing material. I find for myself that a skirt that is gored is much more convenient than a skirt gathered on to the waist, because if you go outside and stoop over, the full skirt all falls to the front, and so it is when going upstairs. The gored skirts are very much handier than the gathered ones. We nearly all of us have to wear our cast off better clothes in the kitchen. That is all right, but before doing so rip from them all their furbelows, take off the lace and passmenterie, which grace the drawing room but have no place in the kitchen. I think probably nothing looks quite so bad as to see a lady with a waist all trimmed bending over the wash tub or bake board with the waist all dust and dirt. In buying material for a new best dress get good material. If there are two pieces of cloth, and one is seventy five cents and the other a dollar, or one is fifty cents and the other seventy five, and you look at the two, and see that one is much superior in quality to the other, take the seventy-five cent piece. It will pay you. You will be quite safe in taking the more expensive, because when we consider the linings, trimmings and making, they come to just as much on the poor material as on the good, and you will have the satisfaction of always wearing something that is good. For my own part I would rather wear a dress two years that is of good material and well made, than wear one of poorer material and get a new one every year. With regard to hats and bonnets, I usually have before me a great many ladies from the country, and I always tell them to shun poor flowers whose beauty always disappears in the sunshine, and poor feathers which soon droop with the rain, and whose quills stick out like the quills of the fretful porcupine. We must go from the crowns of our heads to the soles of our feet. If we give thought and attention to our hats and bonnets we should give far more special attention to what we wear on our feet. The one does not hurt our health, but unless we are properly shod it is going to very materially affect our health. What would any mechanic think of another man who put in a fine piece of machinery and didn't have it on the right perpendicular? It was to be set up perfectly level, but he said it wouldn't make much difference to have it half an inch higher on one side than the other. We are of vastly finer mechanism than the finest machinery made by man, and yet we think nothing of putting our body decidedly out of plumb by wearing high heels. Doctors have told me that many a backache and headache is attributed to the shoes a woman wears. The proper standing position is to have the weight right on the ball of the foot. High heels throw the weight on the toes, causing a constant strain right up the back bone, and especially on the nervous system. This should not

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be. With low heels the weight is on the ball of the foot, and if you are in the right standing position you should be able to rise and fall without throwing the body back. Some people throw their weight on their heels, and they are never graceful. Never wear to a finish the high heeled slipper, or low heeled thin shoe in the mornings. Have boots on purpose to do your work. They may not be expensive, but to ensure good health they must have low heels and thick soles. These two essentials are necessary; and we find that a great deal of the sickness and a great many colds are caused by wearing the low shoe in the house and also on the street. We notice girls out on bitterly cold days with their ankles exposed. To have good health it is necessary that the ankle and foot should be well protected. If the gentlemen were here I would talk just a few moments to them, but the ones who are present I think probably do not need coaching with regard to what they should wear.

Now, with regard to the farming element of our country. A couple of years ago I read an article saying that the youths of our towns and cities did not give that respect to the farmers that was due them, and the article went on to say that in the West and in England the farming community were very much more respected in the cities than was the case in this Canada of ours, or more especially in Ontario. I had spent several years in the West and knew the state of things there, and had spent two summers in England, and my time was largely spent in the rural districts, and so I thought I was a very fair judge of the existing conditions in the three places mentioned in this article. Our West is composed largely of young energetic men, who have left here to seek their fortunes in other fields. They know that they have to be careful of their manner and also of their appearance. In England, when the English farmer goes to market he does not go as he comes from the stables. He blackens his shoes; he puts on his second best suit of clothes; and if he doesn't wear whiskers he shaves himself, and he looks the gentlemen he is. The world cannot withhold its respect from the man or woman who by their conduct and appearance demand it. We get just as much respect as we deserve. And so I tell the farmers when I talk to them to take just a little more thought with regard to their personal appearance if they want to get that respect from the youth of the towns and cities. Michael Angelo says that "Trifles make perfection, but perfection is no trifle." It is the little things of life that are causing all the strife. So it is with regard to our toilet. It is the trifles, it is the little things which make or mar one's appearance. No matter how well fitting the gown may be if there are two or three buttons off the shoes, or if the gloves are out of the fingers, in the mental photograph we have, do not the gloves or boots stand out in greater prominence than the well fitting gown? Michael Angelo was right, "Trifles make perfection, but perfection is no trifle." As far as possible let us at all times of the day be presentable. Very often the impressions we have of a lady would be greatly changed after a morning call. We should at all times try to be presentable. Perhaps our clothes cannot be spotless if we have our own work to do, but we can have a cared for look; we can have a collar on or a bit of ribbon around our neck, and if we attend to the little things we will not be altogether taken unawares on Monday morning.

My talk has not been to the butterflies of fashion, for in my opinion they spend too much time on dress. We can go to extremes. We must clothe our minds as well. Let us clothe them with beautiful thoughts and ideas, so that when we talk there will not be that difference between our appearance and our mind. Have you ever seen a well dressed lady, faultless in her appearance, and when she opened her mouth, oh, my, you notice such a change? Our appearance and our mind should be atune with each other. The beautifully gowned woman should have a well cultured and well trained mind, so that there will be harmony between the inward and the outward. One literary woman, who lived a very active life, took two weeks in the fall and two in the spring which she devoted solely to the replenishing of her wardrobe; then the other part of the year she was perfectly unconscious with regard to what she had to do, she had nothing, in fact, more to do with her dress. She was a very wise woman. We should look to it more as a business, and not let all the little fashions that come in cause us worry and anxiety. I started 3,000 years ago with words from David, and in closing I think probably I can get nothing more appropriate than to go three hundred years back and quote from Shakespeare :—

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"Costly thy habit as thy purse can buy
But not express'd in fancy; rich, not gaudy;
For the apparel oft proclaims the man."

MRS. HOODLESS: I believe that as women become better educated and understand the scientific composition of their bodies, and the importance of proper clothing, that they will adopt more rational measures. You know an eminent psychologist says woman's development was arrested some years ago, and it is only beginning to grow again. We hope soon to come back to our normal shape. I think when it becomes more generally expected and is understood to be an indication of intelligence, you will find women will adopt these rational measures more generally, and it is only through such discussions as this that progress will be made. I could not help thinking when I saw this session entirely devoted to women's work that it was a sign of progress.

MISS HOPE: More especially in the States than here, I was extremely surprised at the amount of undress of the ladies in the mornings. So many who would be extremely well dressed in the afternoon, would be found, if taken unawares in the morning, with their hair, it may be, combed in braids and in curl papers, and untidy—with what they call wrappers on. I would like to speak as an English woman, and say that I never in my life, from the time I was a child, except amongst the actual working women and their children, saw such a thing; from the smallest shopkeepers to the people living in the best houses, did I ever see a girl or woman come down to breakfast except neatly dressed. I have only been in Canada such a short time that I cannot say anything about it here, but I lived in the States for a good many years, and it was a matter of surprise to me to see such untidyness, and I wondered how their husbands could have respect for themselves when their wives and sisters came down to breakfast in such an untidy state.

Prof. ELLEN H. RICHARDS: There is only one point which I might mention. Miss Rose spoke of the wearing of wool next to the skin. Now, I suspect that many of you may have had a mental reservation over that, and I want just to say one word as to reasons. I do not know anything about "Dress," but clothing is an entirely different thing. The object of clothing is to keep the body warm, is to have an even layer all over the skin in such a way that the cold air will not come on one part any more than any other. That is the principal thing in our changeable climate. The one thing which is a non-conductor of heat is air. If you put double windows on your house you do not expect the two panes of glass to keep you warm; it is the air between the two panes of glass. Wool is woven loosely and contains the air, and that is why the wool is warm and keeps you an even temperature, while the thin, smooth cotton or linen is so compact and has so little warm air in it that, as you might say, it feels cold. The great objection to wool is the fact that it does not wash so well, and the cotton or linen seems to wear better. There is a new weave of cotton or linen which is being advertised, but whether this loose, fluffy linen or cotton weave is going to all mat down on wear, and become just as hard and compact as our ordinary cotton or linen, can only be determined on trial. But if it does not, those who cannot use wool can perhaps use that. It is not the fineness or weight of your clothing, but the amount of air you get between the clothing. Of course, on a very cold day you use impervious skin or something like that, but I am talking of the ordinary clothing we use to keep the body in ordinary temperature.

WOMAN'S WORK.

BY MISS BLANCHE MADDOCK, GUELPH, ONT.

As the Chairman has already said, the subject of my talk was to be "Domestic Science," but as we have Mrs. Richards and others to deal with this and kindred subjects, I shall not take it up in detail this afternoon, but I should like to say a word to you about the home and women's work throughout the country in general. It is a significant fact that this is the first time in the history of the Experimental Union that a separate session has been held for women, and it is worthy of note, because it is an official recognition of the fact that it is just as important that housekeepers should discuss subjects relating to the up-building and beautifying of the home as for men to discuss subjects relating to the farm. The Hon. John Dryden has said that in his opinion the

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greatest hindrance to the advancement of the country is the tendency on the part of young men to drift away from the old-fashioned home life. It is true that throughout the country we do hear this complaint, that the boys are becoming dissatisfied with their homes and are drifting away into towns and cities. We also hear the complaint that girls, especially in the country, are more favored than boys; that the boys, in order to save carpet and furniture, are kept in the kitchen during the evening, and then sent up a backstairs to a back room devoid of comfort and luxury, while the girls have the use of the front rooms and freedom of the house generally. I believe there may be an element of truth in this complaint, and for this reason I should like to say a word to the young ladies present. Why not make the home life just as pleasant to the boys of the home as possible, and begin by fixing up their rooms. I think there is nothing that gives a boy so great an interest in the home as to feel that he has some place he can call his own, to which he can invite his boy friends. Have the home warm and bright, and urge your brothers to invite their friends in, and then help entertain them. When I say "brothers" I do not mean only the elder ones. I think, if there is a tendency to neglect any of the boys, it is the younger ones. There is no time in a boy's life when he is so easily influenced as between the age of 12 and 14; after he reaches the age of 18 or 20 he generally receives attention enough. Then, try and make the home life pleasant for the younger as well as the elder brothers, so that in after life, as they go out and leave the home, you will have the satisfaction of knowing that you have done your best. However, granted that there may be some truth in this, when we come to educational advantages, have not the boys had first place? Trace history back as far as you will, and you will find that every educational institution has been first opened to the boys, and girls have only been allowed to enter after a great deal of pressure. In my opinion these conditions should not exist on either side. The home should be free for the brothers as much as for the sisters, and education ought to be as open to the sisters as to the brothers. We cannot expect young men to go out into the world fired with noble purposes and high ideals if they have not had the helpful, strengthening influence of a refined and cultured home, and we cannot expect women to make a refined and cultured home without education and training. In the past, while it has been considered quite the right thing for boys to spend years in learning a trade or in fitting themselves for a profession, the girls have been supposed to know how to do their life work by instinct. Whether this is to be considered as an acknowledgement that girls are better fitted to take hold of any work and make a success of it, or whether the idea has been that any one can do housework, we will not say. However this may be, you will agree with me that the women of this country have taken hold of the work with which they were entrusted, that of home making, and have done their best, and with the result that we are all now willing to acknowledge that there is no dearer place on earth to us than home. Mr. Gladstone has said that the home is the basis of the nation, and that around the home all other interests revolve. Then, as a nation, do we not owe it to the mothers and sisters of the country to relieve the drudgery and lessen the monotony which so often falls to their lot, and give them such a training and education as will enable them to do their work in the best possible manner and with the least expenditure of time and energy? To the mothers and sisters I would say, as homemakers and nation builders, let us realise the responsibility laid upon us in this new century. Let us make up our minds to do all in our power to find out the requirements of the home, and not be content to continue in the old ruts, but endeavor to unite the interests of the home and thus strengthen the family ties, so that in after life, as the members of the family scatter far and wide, they may each look back to the home as the spot around which are clustered their dearest, sweetest memories.

Home, generally speaking, is for three purposes, to minister to the moral, intellectual and physical requirements of the family. It is surprising how much the moral and intellectual natures depend on the physical nature. Scientific men tell us that if a child is fed solely on one kind of food, such as strong meat, it tends to make him vicious and cruel, while on the other hand if he is fed entirely on other foods it tends to make him dull and stupid. While much has been said as to balanced rations for animals, we have heard very little as to the combining and selecting of food for children. However, during recent years this subject is receiving more attention from thinking people, and as a consequence schools have been instituted in Europe and also in the United States, and

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to some extent in Canada. In these schools housekeeping in all its branches is taught, but emphasizing more particularly cleanliness, method and economy. In speaking of this subject, we sometimes hear gentlemen say, "Surely the mothers, who have been housekeepers all their lives, should be able to teach the girls these things at home without going to school or college to learn them." Of such gentlemen I like to ask, "Why do you send your sons to college to learn farming? You have been farmers all your lives, why not teach them at home?" Is it not because they realize that farming has become a science, that certain fundamental principles must be observed if they wish to attain to a fair measure of success? It is just the same with the mother in the home; housekeeping, too, has become a science. Cleanliness is studied in its relation to the health and comfort of the family. Then in regard to method, there is nothing, perhaps, has so great an effect upon the every day comfort and pleasure of the family as the way in which the routine work of the house is done. In regard to economy, surely we all agree that it would be advisable to teach the girls to carry on the business of the home as economically as possible, at the same time securing a maximum of comfort from a minimum of expense.

I should now like to say a word or two with regard to another great movement for the advancement of women throughout the country, and that is the formation of Women's Institutes. Some years ago, Dr. Mills in thinking of the necessity of an agricultural education, came to the conclusion that, as he could not bring the masses of the people of Ontario to the college to be educated, he would take the education of the college to the people. Thus, in the year 1885 the first Farmers' Institutes under that name were organized. The first year there were between 300 and 400 members, but they now number almost 19,000 men through the Province of Ontario. What Farmers' Institutes have done for men, Women's Institutes aim to do for women. In 1897, the first Women's Institute was organized, but through the energetic efforts of Mr. Creelman, the Superintendent of Farmers' Institutes, they are now being organized in nearly every County in the Province. Since the organization of these Institutes, farming has received a new impetus; men are becoming proud of their profession, and the old cry of drudgery is not so often heard. Statistics prove that more women in the country go insane than any other class of the community. This is due not so much to overwork as to the monotony of farm life. The same work is done day in and day out, with no thought but to get one thing done, and then to start at the next. But, as Women's Institutes are being formed throughout the country, women are beginning to think more of the nobility of their work and less of the drudgery. A year ago I attended, with Miss Rose, the first meeting of the South Ontario Women's Institute. As it was one of the first in the Province, the ladies were rather anxious as to results. However, they went into the work feeling that if it were possible they would make a success of it, and they certainly have done so. A week ago I had the pleasure of listening to an address by Mrs. Brown, President of the South Ontario Women's Institute, who gave a most delightful report of the year's work done. Among other branches of work they have a circulating library. Books, such as Chemistry of Foods, Home Sanitation and the Kitchen Magazine, are distributed among the members. The sphere of Women's Institutes may not appear of interest to women in the city, but surely any subject which is of such vital interest and importance to women in the country should be of interest to those in the cities. If the study of Domestic Science is of interest to those in the city, it ought to be of equal interest to those in the country, and it is for this reason that I speak on this subject of Women's Institutes this afternoon, in order to give us some idea of the work, so that we may be able to speak of it intelligently to those we come in contact with from the country. How many of us get our butter and eggs from the country? Then, can we not show them that we have some interest in their work and understand the difficulties with which they have to contend, and thus help to deepen the feeling of unity between town and country, and solve, to a great extent, one of the problems disturbing the mind of the social economist of today.

I should like also, not only on my own behalf but on behalf of all the young ladies who have taken the Dairy School Course in Guelph, to thank Dr. Mills and the staff, as well as Prof. Dean and the Dairy Instructors, for all the help they have given us. While the boys may have had the first chance along educational lines, yet as far as it was in the power of the staff, no discrimination has been shown in this College in favor of the

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boys, and for this reason I hope that the first public Domestic Science School will be in connection with this College, as I am sure it will receive the hearty co-operation of the entire staff and I think I may say the students as well.

MISS ROSE: With regard to the Domestic Science Course in connection with the O.A.C., I have thought of that considerably. I meet gentlemen who say, "I would send my daughter if she could learn to cook as well as make butter," and along this line the ladies themselves say, "Will you teach us how to cook? Will we learn how to make bread?' And I think the time has now come when, in connection with our three months, course at the dairy school, we could have a session on some lines of home work. It is not altogether necessary that they take the afternoon discussion in connection with the dairy school as they now do; and if in the afternoon they could spend two or three hours under some competent teacher it would be an advantage. I go around and am in a great many farm homes, and I find as a rule there is a great deal of good food wasted through improper cooking, and I throw out this suggestion, which I think could easily and with not a great deal of expense, be carried out successfully.

MRS. HOODLESS: I may say that I do not think I was ever happier in my life than I am this afternoon. I think you may claim the credit for being the moving spirit in starting the Women's Institutes as well as the Farmers' Institutes. If I remember aright it is five years ago since I addressed the Experimental Union here. The next morning one of the ex-students of the college came to me and said, "You struck the key-note last night when you said we know more about feeding live stock than our wives and daughters know about feeding us. Can't you do something to stir up some enthusiasm?" The Board of Education for the town of Galt came to me and asked if I would not go out and give the women of their county a talk. So you see it all started here. When in England the summer before last, I discussed the question with a great many agricultural and horticultural people, and it was quite a new idea there. We have carried on a Women's Institute in the county of Wentworth for three years, and there is a large membership. They meet fortnightly and discuss everything between heaven and earth, but we have got to a point now when we want more than papers and theory. We all realize that we need practical teaching. It is all very well, it is charming, to listen to a well prepared paper, but it is a vastly different thing to have a theory in your head and be able to perform it. What we want in the Institutes is such ladies as Miss Maddock and Miss Rose, who will go into some one's dairy, have the women meet them there, and show them how to make butter. We want women to go to these Institutes who will go into the kitchen and show them how to make bread, show them how to truss their fowl; if necessary bring the poultry in. We must have scientific training at the bottom of things. We have got past theory, and I appeal to Miss Rose and Miss Maddock to get the trained teachers who will go out and give practical instruction in those places. It may be interesting to know that the Women's Institute of Saltfleet memorialized the Government to institute a Women's Department at the Guelph College. We sent a request to the Minister of Agriculture, asking him to favorably consider the building of a Women's Department at the Guelph College. A gentleman said to me, "You will have to wait until there is a more general demand." I said, "No, sir, that is not our nature; when we wanted a School of Domestic Science we did not wait for the demand, we created the demand." You will never get a Women's Department at the Guelph College until we stand shoulder to shoulder, and it is only by putting in the thin edge of the wedge that we will get the building. Just before I sit down let me say that I was told when in England that the good butter and properly separated and packed eggs when sent to England were labelled "British" because the Canadian produce had a bad name, and if it was labelled "Canadian" it would not fetch a good price. I asked why, and they said that so much of the Canadian produce came in such bad shape that they could not put it on the market. Until we have the women educated and aroused to understand the financial value of this higher education we will never secure the recognition we should. "A house divided against itself cannot stand," and a man with an unsympathetic wife is very sadly handicapped. We certainly need the same training for our girls as for our boys.

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HOUSEKEEPING IN THE 20TH CENTURY.

BY ELLEN H. RICHARDS, INSTRUCTOR IN SANITARY CHEMISTRY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

All true portrayals of the early days of the century just closing bring out clearly the active, productive life of the Anglo Saxon household and the major share which the women folk had in it. The boys were then mother's helpers. She gave the directions, and they followed them. Her brain planned, and their brawn did the work. If it were preparing the winter stock of meat, the moment life was extinct the direction of the cutting up and preparing passed into the housewife's hands. It was she who directed where the barrel for leaching the ashes should be placed, and what roots and herbs should be gathered for the dye pot and medicine chest. Her mind was busier than her hands for she directed many pairs of the latter—those of her ten or twelve children as well as of bond servants or paid helpers of later date.

There was no stagnation in the household of those early times. Skill of hand and steadiness of eye proved the brain cells to be in good working order. The qualities of foresight, preparation for winter of sufficient stores, judgment as to how much was required, ingenuity in securing variety from the meagre materials, all tended to develop strong personality, and the sons of these housewives were the statesmen of America. Whose name can you speak, of our public men who have recently passed on at the age of sixty or seventy or eighty, of whom the obituary did not disclose the fact that he helped his mother in her housekeeping? This predominance of the manufacturing woman soon passed in all except remote districts. Why? Because she kept her eyes on the immediate work. She took very short steps forward, and those mostly in imitation. She did not think out new paths unless forced to do so by circumstances. Then, her brain acted quickly and well. The sons having less chance for inventive ingenuity in the tilling of fields and guarding herds, began to watch the work of the household. Their fingers itched to try new combinations. Now and then a mother was proud of her son's devices. Finally the *factory* and *shop* were evolved, and more yards of cloth and pounds of candles were made for the same expenditure of energy. Soon the women were given easy chairs and yards of silk, a rocking chair and a novel, and were flattered into the belief that they were rising in the scale of living by being "protected." Life was to be made easier. Water was brought into the house (likewise sewer gas), dark closets were turned into bath-rooms; patent soaps and cereals led naturally to patent medicines—taken to cure the ennui and lassitude that followed from the general stagnation of mind, resulting from lack of occupation; women were pushed aside and told "You cannot, it is not ladylike"; "little girls were made to be seen"—models upon which to hang the pretty things the world delights to make; service became *common*, and grew more and more ignorant as the mistress knew less of the processes by which raw materials were produced and of the values and wearing qualities of the articles made up.

Feeling the supremacy of power over things slipping away, the more adventurous spirits sought a remedy in education, and demanded and secured the same education as their brothers as an outlet for their energies, as a safety valve for the social machine. This has served an admirable purpose, but it has not put power back into the hands which so firmly held it a century ago. Why it has failed, we will discuss later.

To follow our story, the housekeeping as we find it to-day consists chiefly of spending money—$500, $5,000, $50,000 a year. The young bride begins her life in a house or an apartment already designed by some young man, perhaps, who has never had anything to do with running a house; who puts doors and windows where they will look well from the outside, and stairs wherever there is a spare corner. The finishing woods, the sideboards, the window seats, the cupboards, the mantels and nearly everything except chairs, tables, rugs, and common china is already in place when she takes possession. The walls, even, are already finished. Her first duty is to fill in the gaps in her wedding presents, to exchange duplicate cut-glass dishes or sets of spoons for something more useful, or not infrequently for money. Usually there is left a hodgepodge of colors and shapes to be placed as best they may, and for which a background is to be furnished. What knowledge has this young woman at her disposal to guide her in this difficult task—difficult

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because of her ignorance, of her mother's ignorance, and of her friends' conflicting advice; delicate because upon her choice hangs the future fate of the family. If she buys, with taste and discretion, with reserve of funds, only that which has a meaning and value in the life to be lived, the family will grow into their needs and develop character and learn to enjoy their surroundings, but, if she is lavish and easily beguiled into taking that parlor set which "is just coming in," that lounge which is like one Mrs. A. has purchased for her villa, and that rug the mate to the one Mrs. C. has for the dining room of her new house on Grosvenor Road—only to find when they are sent home that they do not suit the cramped apartment or small house, either in size, shape or color—that is, if she is sensible of the fact that they do not suit, of which there is small chance. A greater probability is that she will experience a glow of satisfaction at her smartness, and ruin the tempers of her family and drag at her husband's purse in trying to live up to that lounge and rug—divorce and suicide have resulted from lesser causes.

Next our bride installs her servants. The wise one has saved enough from her furnishing fund by refraining from purchasing everything a house could possibly need, to lend to her service fund during the first months of fitting into harness. She knows that only the most experienced dressmaker can do with one "trying on"—that the cheaper the service, the more fitting before an approach to satisfaction can be had. Therefore, if she must begin with low-priced help she must expect to "try on" a few times, but, as she counts the cost in choosing her dressmaker, so she decides that this will pay in the end. While the pretty things are new, social duties are comparatively few, and the delight of possession holds, is the time to conquer all the details of the daily routine, and that once settled, the rails once laid, things roll on with comparatively little friction. It is easy to add a new picture, or a handsome rug, or to get a better trained servant when she has the money to pay for them.

But how does the self-sufficient, untaught bride fare? She, having spent all and more on her house, thinks it easy to save from her allowance (alas for those who have no such check) by engaging cheaper service, all ignorant that such hands have not the skill to care for her rare china and delicate fabrics (I know of one maid who destroyed $90 of bric-a-brac and glass in one week), nor the ability to prepare the table to correspond with ruined furnishings and tempers, illness and discouragement are sure to follow; a peevish disposition becomes so fixed that future housekeeping becomes embittered, if not made impossible.

But although manufacturing is taken away there is eating and dusting, sweeping and washing still left in the house, in fact they are about all that is left. To whom shall our young housewives go for advice in these troublesome matters? Not to the housekeeper of a past generation, for conditions have changed; we have the markets of the world at our doors. We have become dainty and finical in our tastes; we have become sensitive to dust and odors; we are living in an age of dusty streets and crowded cars, an age of soot and grease, of microbes and feather dusters; we are travelling across a prairie guiltless of sails and guides; how shall we pick our way? Customs have not become so fixed that habits of living occasion no comment; the struggle to get to a supposedly higher standard of living has led to the mistake of supposing every little pinacle a mountain peak, and besides all this cooking and eating which fills the hours, we are ignorant of the fundamental principles and we see no results—no piles of linen, no barrels of beef, no boxes of candles, no strings of dried apples, not even a closet of preserves remains to tell of our labors; each day is like every other; each week brings the same trials and no advance. It is a tread-mill, it is drudgery because it is not creative, thoughtful work. It is like driving in a nail only to have it pop out and have to be driven in again, or like picking up a stone only to have it slip out of the fingers to be picked up again. Fashion causes much of the modern expense.

Housekeeping at the present moment, is in the transition stage and is, undeniably. unsatisfactory, and unsatisfying. But need it be in the next century? I think not if our young women will take another step and fit themselves not only for teachers of Latin and mathematics, but for practical employers of labor and purchasers of material. To employ labor discriminatingly implies a knowledge of what is to be done, how to apply suitable force to the getting it done. The greatest effort in the mechanical world is spent on abolishing friction, natural forces are utilized whenever possible. How is it in the housekeeping world? How many of us know whether our machinery is running without

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friction? Whether there is a back balance action, whether we require a maid to go up and down stairs so many times that the effort would tire a hod carrier. She has nothing in her hands. No, but she has herself to lift. How many of us have considered the path of the food or the dishes. Let us drop a thread each time and see how many times it crosses. How many minutes should a maid give to the setting of a chamber to rights? How long does the clearing of the parlor take? It has been found that house labor brings about eight cents an hour. How can it be skilled? But, if skilled labor can do three times as much in an hour, then it is not dear to pay twenty or even twenty-five cents an hour. If the man from the Buildings Care Company, who cleans your windows at thirty cents an hour and finds himself and his tools does as much in half a day as your maids can get through with in two days, is it not economy to employ him?

The greatest need in the education of the 20th Century housekeeper is in values,—values of textiles, of woods, of food. No one will study these, however, until the place of the home in the social life is re-settled, until the new product of the home is seen in the men and women developed in them, in the character and ability which is for the world's service of greater value than can be obtained in any other way.

Can the child be taught those elements of manly and womanly duty, self-control, self-sacrifice, self-restraint from a present good for the sake of a future greater good anywhere else as well as in the family circle? Is there any other bond which will hold wayward fancies and still wild longings as firmly as the *home* bond? If not, then, at all hazards there must be a house and home and a housekeeper whose spirit pervades the walls, the furniture, the food, the servants, the air. We are only beginning to understand the subtle influence which affects us. The food prepared by an angry cook does it agree with us?

Mistress and maid no longer work together welding the life into one homogeneous whole. The daughter no longer takes her share in the routine; the man of the family only boards in the house. Unless he cares for the furnace or does the marketing he comes into no close relation with the machinery. But is this divorce of the home and the family life necessary? Not if it is once seen that the home is the mightiest educational factor possible. That within the house walls are developed the faculties of organization; the training of the judgment; discipline of mind and body; correlation of hand and brain.

The school is doing and must do much of what the last century home did; but if all the students of sociology are not wholly wrong, the home even in the 20th Century —that Golden Age to which we are, some of us, looking forward—must have its place in the life of the Anglo-Saxon race.

To have the new ideal house and home, we must have the real new woman with scientific knowledge and training in the use of power. The fact is that in present housekeeping, we are using an ancient machine, that creaks at every joint and loses half, yea more, of its initial energy by friction.

A first duty of the mistress of every household is to reduce this friction. I believe that a large part of the friction in domestic circles is due to an inability on the part of the mistress to direct others in a clear, precise manner once for all, and to a lack of knowledge of the time it takes to do work.

I know that you are all anxious to have this little sermon done and to ask what is modern scientific housekeeping? How does it differ from our ways?

Jane Adams, of Hull House, tells the story of the woman who replied to one who was trying to show her the value of certain foods. "I don't want to eat what is good for me; I'd rather eat what I'd rather."

Scientific housekeeping is what is good for us; a systematic division of the income between the different departments of expenditure; a careful balancing of the claims of each side of our nature. It is only possible in perfection in the house which the new architect shall build for us.

Mrs. Hoodless: I should like to ask Mrs. Richards to express her opinion as to how this can be brought about. For instance, our first movement was in the direction of instituting Cooking Schools, and we found that those who came were the good housekeepers, and those who really required such teaching would not come within a mile of it. We found that the women themselves were the greatest obstructionists. This worried us for some time, and we finally decided that the only way by which a new state of things could be brought about, was to begin in the public schools and teach the children these

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first principles. And I would like to ask Mrs. Richards if she does not think this is the only way we can overcome the old habits.

Mrs. Richards: A professor of psychology said the other day at the closing of my college that we would never get any light on it until we made it part of the pupils' religion; that in many of these things we had been apt to consider them of not much importance. I agree with you. I don't know of any place to begin except in the Public Schools; not to put it in as an extra thing, but as part of the Natural Science education, just as much as anything else educational.

Miss Ross: I would like to ask if the education along that line is to be practical as as well as theoretical.

Mrs. Hoodless: That is the value of it. The children put in two hours weekly with all the utensils of a kitchen. That is what we want, a practical application of the theories they learn in other departments.

Mrs. Richards: I think we may have to possibly consider a little modification at first. I do not believe that it is possible to put fully equipped kitchens in all your schools in Canada. The people we want to influence are the ignorant ones. Here you are more fortunate than we are in some of our foreign population. The thing to do is to give the children in school the general principles, and then have them practise at home. With us many times they could not have a place to practise, but my observation as I have been through Canada is that in a great many places you could introduce the thing.

Mrs. Hoodless: The principle we adopted here, and I think it prevails in Europe to a great extent, is this,—that there is a centre, and the children go to that centre one or two hours a week. The Junior and Senior Fourth Book girls take the course, and it requires a good deal of genoral knowledge. You send a child to open a window, and it will let it down mechanically and walk back to his seat, and not think anything more about it; but if he understands why it was let down he will take an intelligent interest in it. Just the same with the cooking. You teach a child the effect of heat upon starch, and so on, and to a great extent you impress it on him. You must educate the child's taste. Therefore, we claim there must be one centre at any rate where the children can go and receive this practical training. I was asked a few years ago to give an estimate of how much it would cost to put it in the schools of Hamilton. It would cost us $2,000, and that meant, to a man paying taxes, the colossal sum of four cents a year to have his daughter taught cooking. In Guelph it would cost you about $100 a year to have it taught to the senior girls in your schools.

Dr. Mills: It would be a great benefit if you could teach them how to cook tough beef to make it tender. I know our boys would support a school if they could do that. Glasgow is said to have the best municipal corporation in the world, and there they have lady inspectors, who visit the homes of the poor to see that they are kept clean, and if the lady's house is dirty or neglected, not a suitable home for children to grow up in, she is reported and dealt with. It seemed to me a most extraordinary thing. They said, "We cannot afford to raise children whose future is blighted by being obliged to grow up in filthy, dirty homes, therefore, we will employ women to visit these homes." I met some of the ladies who visited these homes to see that they are properly ventilated and clean, and one lady told me that they plead very hard to have another chance before reporting them. They think they are doing a great work there.

Mrs. Hoodless: That thought of Mrs. Richard's this afternoon is, I think, the keynote of the whole work—creative interest. When it is taught that our body is composed of certain elements, and that the food must go to keep that body in repair, and that when they go to prepare food they must consider the essential qualities of that meal, there is an intelligent interest in it which is otherwise impossible. It is just that haphazard way of doing work that is driving our intelligent girls out of the kitchen. Let me give an instance of one experiment tried in Glasgow. In the mill district there were, perhaps, three generations, and all sorts of vice prevailed in that district. A lady, who was interested in Domestic Science, thought she would like to have it introduced into the school there, and out of 600 children who went through her hands she reported 350, who, instead of going to the mill to work, had gone out to domestic service. That she gave as the effect of scientific teaching. What is the use, as Herbert Spencer says, of being able to quote Dante in the original when standing by the death bed of a sick child if you cannot make a proper poultice. We find that our university girls are not the most

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practical, and many of them say that if they had their lives to live over they would take it differently, as their education has not brought to them their highest good.

Miss Hope: I can only speak, of course, from the personal experience I had in teaching this work in the schools in Boston for many years. The beginning of it was uphill work, as it is in every part of the world, and some of the parents thought they did not care for it. At the end of two years, 250 parents were visited and asked their opinion of the work. Their daughters, girls of thirteen and fourteen, had attended the school, and there were only two out of 250 that did not thoroughly approve of the teaching. One mother said she could teach her daughter just as well at home, and the other one said her daughter had not learned to make doughnuts. Now, of course, after the fifteen years' experience which I had in Boston in that particular branch of work, I see results. I think perhaps one of the most satisfactory things in this kind of work is that when you have been many years teaching it in one place you hear and see results. Before I left I met many of my old pupils who were housekeepers, and only this last Easter I went to visit Boston, and met one of my old pupils on the street, one of the very first fifteen years ago. She came up to me and said, "Oh, Miss Hope, I am married now, and I have all the recipes and remember all you told us. I thought I had forgotten it all, because after I left school I went through the Normal College and taught school. When I had a home of my own I looked up all my notes, and began housekeeping on your plans. If it had not been for them I could never have kept house; I should have had to board." Mothers in the poorer districts have come to me and said, "We cannot afford to have our daughters waste the things at home. I have not the time to teach them, and if I had I don't know just how, and I can't afford to have food wasted." It was said to me not very long ago that it was very good for the poor people, but we do not want it for the rich. In how many homes are the rich certain that they will always have servants to serve them? Fortunes go up and fortunes go down; a girl has been brought up on every luxury; money is gone; what is she to do? She has to take care of the house herself. In the home where there are servants, the servant objects to the daughter going into the kitchen and messing; she doesn't want it done. How is that daughter to learn housekeeping? In the school. In this country we begin in the upper grades. I hope to see the time when this thing will be taught in the kindergarten, and gradually brought forward from year to year, and the children taught to reason why they are taught a thing. We do not teach fancy cooking at all. If a girl has gone through a theoretical course in the school in the methods of cooking, and knows all about ventilation, she then ought to be a perfect housekeeper if she will follow out the lines she has been taught. No person can learn a thing in a year, but the foundation is so laid, and the practice they do at home is carried out so successfully, that she ought to be able to go and do any cooking. I do think that is the one thing we want to do, to get the girls thoroughly interested in the work, so that they will do it in their homes.

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THIRTY-SECOND ANNUAL REPORT

OF THE

FRUIT-GROWERS' ASSOCIATION

OF

ONTARIO.

1900

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

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THE CANADIAN FRUIT EXHIBIT AT PARIS, 1900.

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FORTY-FIRST* ANNUAL MEETING

OF THE

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

1900.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to submit the Report of the Forty-first Annual Meeting of the Fruit Growers' Association of Ontario. At this meeting especial prominence was given to methods advisable for checking the spread of the San Jose Scale, the revision of the proposed bill providing for the grading and inspection of fruit, and the development of the export trade in Ontario fruits.

I am, Sir,

Your obedient servant,

L. WOOLVERTON,

Secretary.

GRIMSBY, January, 1901.

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* This Association was first organized in Hamilton in the year 1859, under the title of 'the Fruit Growers' Association of Upper Canada.

Secretary.

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FRUIT GROWERS' ASSOCIATION OF ONTARIO.

OFFICERS FOR 1901.

President.—W. M. ORR, Fruitland.

Vice-President.—G. C. CASTON, Craighurst.

Secretary-Treasurer and Editor of the Canadian Horticulturist.—L. WOOLVERTON, M.A., Grimsby, Ont.

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" "	11—(Perth-London)	....	T. H. RACE, Mitchell.
" "	12—(Essex Lambton)	....	ALEX MCNEILL, Walkerville.
" "	13—(Algoma-Manitoulin)	....	C. L. STEPHENS, Orillia.

AUDITORS.

A. H. PETTIT, Grimsby; GEORGE E. FISHER, Freeman.

COMMITTEES.

Executive.—President, Vice President and Secretary.

Finance.—W. M. Orr, M. Pettit, A. M. Smith.

Board of Control Fruit Experiment Stations.—W. M. Orr, A. M. Smith, Wellington Boulter.

New Fruits.—Prof. H. L. Hutt, O.A.C., Guelph; Prof. W. T. Macoun, Central Experimental Farm, Ottawa; L. Woolverton, Grimsby.

Transportation.—W. H. Bunting, A. H. Pettit, E. D. Smith, T. H. P. Carpenter, Alex. McNeill, W. Boulter.

San Jose Scale.—M. Pettit, G. E. Fisher, E. Morris, W. M. Orr, Robt. Thompson, W. H. Bunting, J. D. Wigle, Major Hiscott.

Grading and Inspection of Fruit.—A. H. Pettit, E. D. Smith, Elmer Lick, Major H. J. Snelgrove, W. H. Bunting, G. C. Caston, E. J. Palmer, J. M. Shuttleworth, Eben James, R. H. Ashton, D. J. McKinnon, T. H. Race.

Codling Moth.—Joseph Tweddle, E. D. Smith, W. M. Orr and A. H. Pettit.

Fruit Packages.—A. H. Pettit, L. Woolverton, E. D. Smith, D. J. McKinnon, W. H. Bunting, Joseph Tweddle, W. M. Orr.

Industrial Fair.—W. E. Wellington, Murray Pettit.

London.—J. S. Scarff, T. H. Race.

Ottawa.—R. B. Whyte, Harold Jones.

American Pomological Society.—W. M. Orr, G. C. Caston, L. Woolverton, A. M. Smith, M. Pettit.

Quebec Fruit Growers' Association.—Harold Jones and R. B. Whyte.

Life Members.—A. M. Smith, St. Catharines; D. W. Beadle, Toronto.

Honorary Members for 1901.—J. S. Clark, Bayview, P.E.I.; L. B. Rice, Port Huron, Michigan.

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Elmer Lick.

M. Pettit. W. A. Whitney. Prof. Hutt. G. C. Caston. L. Woolverton. W. M. Orr. J. S. Scarff. Thos. Bengough. A. M. Smith.

OFFICERS AND DIRECTORS FOR 1901 AT BRANTFORD MEETING.

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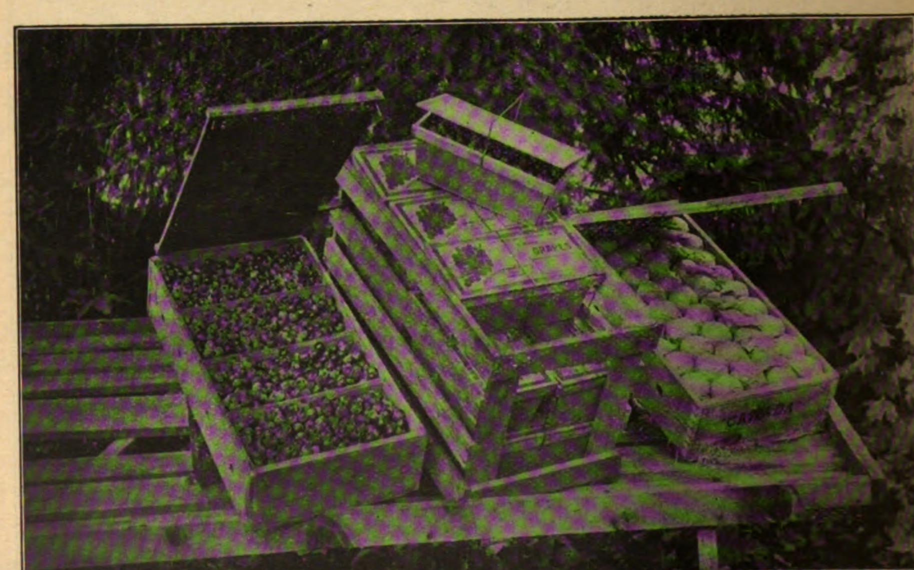
Bushel Boxes of Apples, Half Bushel Boxes of Pears and Packages of Grapes, Packed for Export for Ontario Department of Agriculture.



Wilder Grapes and Kieffer Pears Packed for Export for the Ontario Department of Agriculture.

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FRUIT GROWERS' ASSOCIATION OF ONTARIO.

ANNUAL MEETING.

The annual winter meeting was held in the Council Chamber at ten o'clock a.m. at Brantford, Wednesday, December 19, 1900.

W. M. ORR, Esq., President, in opening the meeting, said: Ladies and gentlemen, the time has come to call this meeting to order. I am glad to know that all the officers and directors of our Association are present, and that so many are with us who are interested in this work. After the vicissitudes of another year we are to meet and greet you. We meet in this beautiful city of Brantford for the second time to hold our annual meeting on the invitation of the Board of Trade of this city, and of the Farmers' Institute of the County of Brant. This is the 41st annual meeting of this Society, reckoning from its first formation in 1859, and notwithstanding its venerable age the end of the century finds it in the full strength and vigor of youth. We review its history with a great deal of pleasure and satisfaction, remembering the excellent work it has done for horticulture, its many pleasant associations, and the valuable assistance we have received from it in our work. We have an excellent programme, giving a list of subjects that are full of interest to every fruit grower in Ontario, and we are fortunate in having secured some of the leading scientists and horticulturists in Canada and the United States to attend this meeting and deliver addresses. I am sure that the business to come before you and the subjects to be discussed will receive your best thought and attention. All are invited to take part in the discussion, and ask and answer questions. We hope that this, the last meeting of our Society in this century, will prove both pleasant and profitable to all who attend it.

The SECRETARY read correspondence from the following places asking for the next meeting: Brighton, F. H. Lazier, Executive Committee of East Northumberland; J. H. J. H. Mowat, Town Clerk; Sam. Nesbitt, apple packer. Cobourg, H. J. Snellgrove, Secretary Cobourg Horticultural Society; J. D. Hayden, President; Directors Cobourg Horticultural Society, Mayor and Corporation, J. B. McColl, M.P. Kingston, The Horticultural Society. Orillia, East Simcoe Agricultural Society, the Board of Trade, C. L. Stephens, Secretary Orillia Horticultural Society; Mayor and Corporation. Walkerton, Secretary South Bruce Farmers' Institute.

The SECRETARY also read a letter from William A. Taylor, Secretary of the American Pomological Society of Washington, and stated that five members had been delegated by the directors to attend the next meeting at Buffalo and it was decided that any other members who would like to attend would be duly certificated as representatives of the meeting at Buffalo by handing in their names to the Secretary.

All these letters were referred to the directors for consideration.

COMMITTEES.

The PRESIDENT announced the appointment of the following committees:

Resolutions—W. A. Whitney, E. D. Smith, M.P., and Mr. Dempsey.

Fruits—Prof. Macoun, Messrs. Morris and Race.

New Fruits—Professors Macoun and Hutt and the Secretary.

Mr. MORRIS (Fonthill): Having a large collection myself, I would like to be relieved from that Committee.

The PRESIDENT: I will name Mr. Dempsey in place of Mr. Morris. For the Committee on Nominations the President nominated two and the meeting three. I nominate Mr. Murray Petitt and Mr. T. H. Race

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The following nominations were made and confirmed by the meeting: Mr. Dempsey, Mr. Harold Jones, Mr. Alex. McNeill.

Mr. Joseph Tweddle (Saltfleet) read the report of the Committee on the Codling Moth, and also the act relating to noxious insects with the amendments suggested by he committee this morning as follows:

REPORT OF COMMITTEE ON CODLING MOTH LEGISLATION.

Mr. President and Gentlemen,—Your Committee beg leave to report the following: Committee met and drafted the enclosed recommendations which were later discussed in an interview with the Hon. Mr. Dryden, Minister of Agriculture at Toronto, and arrangements were made with the Provincial Legislature to incorporate such in an act to compel the destruction of said moth in such municipalities as shall enforce the same by By-law of the Municipal Council. Such an act, with regulations by order in Council, was passed, a copy of which here follows: The regulations in council were not passed until May 24th and required until June 9th before a By-law could be legally passed.

An Act for the Prevention and Destruction of Certain Noxious Insects.

Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. This Act shall be known as *The Noxious Insects Act.*

2. The following provisions of this Act shall come into force and take effect as to every municipality the council of which shall by by-law declare this Act to be in force therein. The council may at any time repeal such by-law, and thereafter this Act and any regulations made thereunder shall cease to apply or be in force as to such municipality.

3. Under the recommendation of the Minister of Agriculture the Lieutenant-Governor in Council may make such regulations for the prevention and destruction of insects injurious to trees, shrubs and other plants as may be deemed advisable. Such regulations shall come into effect and have the force of law after publication in two successive issues of *The Ontario Gazette.*

4. Every municipal council adopting this Act shall in and by the by-law adopting the same appoint one or more inspectors whose duties it shall be to inspect all orchards and to enforce the provisions of this Act and the regulations made thereunder, and to report upon the same to the Council.

5. In case the occupant or the owner of any lot neglects or refuses to comply with this Act or with any regulations made thereunder, the Inspector may cause the necessary work to be done, and shall within ten days make a report in writing to the Council stating the amount of the cost thereof and the Council may thereupon direct that this amount or such part thereof as may appear to them equitable, shall be entered upon the collector's roll against such owner and shall be collected in the same manner as other taxes.

6. Immediately upon the passing of a by-law by any municipal council for bringing this Act into force, the said council shall cause to be delivered to the occupant or owner of every lot affected, a printed copy of this Act and of the regulations made thereunder, together with a copy of the by-law and the name and address of the Inspector appointed to enforce the Act.

7. Any person interfering with the Inspector, or attempting to hinder or prevent him in the enforcing of this Act, shall upon conviction thereof, before any of Her Majesty's Justices of the Peace, be subject to a fine of not less than one dollar nor more than twenty dollars, and in default of payment of the same to be imprisoned in the common jail for the period of not less than ten days, nor more than twenty days.

Regulations by Order-in-Council.

Approved by His Honor the Lieutenant Governor, 24th day of May, A.D. 1900.

Upon the recommendation of the Honorable the Minister of Agriculture, the Committee of Council advise that pursuant to the provisions of "The Noxious Insects Act," (63 Victoria, Cap 47), the following regulations be made for the prevention and destruction of the "Codling Moth."

"1.—It shall be the duty of every occupier of a lot within the municipality, or if the land be unoccupied, it shall be the duty of the owner of such lot, within one week after receiving notice as provided for in the Act, to place bands (as hereinafter described,) upon the orchard trees located upon said lot, as follows: Upon all bearing apple trees and pear trees, and upon all orchard trees of bearing age within forty feet of such bearing trees.

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2.—The bands shall be made of "Burlap" or "Sacking," or similar suitable material, and shall not be less than four inches in width, and of three thicknesses, and shall be securely fastened at a convenient point between the crotch of the tree and the ground.

3.—The occupant or owner shall have these bands removed and inspected, all larvae therein destroyed, and the bands replaced at intervals of not more than two weeks during the months of June, July and August.

A number of fruitgrowers attended special meetings of the Saltfleet Township Council on June 8th and 9th asking that such By-law be passed. The Council declined to act but requested that a series of public meetings, be held throughout the township at the earliest possible date to discuss the advisability of such action, posters were put up throughout the township, and small bills were distributed through the public schools to the residents and ratepayers, and five public meetings were held and resolutions were passed at each, favoring the enforcement of the act. These were presented at the next meeting of the council, July 9th, at which the By-law was passed, and three inspectors appointed to look after enforcement of same. Some time was required to get the necessary printing done and placed in the hands of the ratepayers as required by the Act and its regulations consequently the Act could not be enforced before the 20th of July. Although most of the growers attended to the work earlier there were a few who did not until they were forcibly reminded of their duty by the inspectors on their second visit some two weeks later. About the last week of July and the first week of August, we commenced the work of destroying the larvæ, and chrysalids in our own orchards on the 9th of July. Thus it will be seen that the act could not under these circumstances be enforced early enough to catch the whole of the first brood, but would allow part of the moth to escape and lay their eggs for the second brood. Another feature of the case was that this work had to be done just in the haying and harvest season amongst the farmers; and I understand that the inspectors were privately instructed by the council board not to be too severe in enforcing the Act under the circumstances but rather to proceed as far as possible without making its enforcment a hardship. Another troublesome feature of the work was the scarcity of canvas; such was the demand in Hamiliton that the regular price was doubled and trebled before the season was over; in fact the supply became exhausted and felt paper had to be resorted to. It is currently reported that in some cases bands were put on and never attended to through the inspectors being lenient and not making their final rounds; and I have no doubt that this is true to a small extent. However, the intention of the present council board if re-elected is to thoroughly enforce the act another year and if possible make it a complete success and no doubt they will have the support of the people generally (with some few objecting). Many who were doubtful of the success of the work at first after seeing the great numbers of larvæ, caught, especially the fall and winter brood are now in favor of it. A few who were sworn to defeat the council at the next contest for having pa sed the By-law are now friendly toward them, and from careful inquiry lately public sentiment seems to be strongly in favor of the continuance of the work.

In reference to the conditions of the season it is considered that it has been a very favorable one for the propagation of the pest, being mostly dry and warm without any long continued cold rains to destroy the moth when on the wing or hinder her in the operation of depositing her eggs and also in hatching of the same, added to this the large brood wintered over from 1899, the crop of that season both of apples and pears being a fair one furnishes a food supply for their propagation. Yet such numbers have been destroyed as to permit of a good season's pack of clean fruit, whereas had they not been destroyed but permitted to continue their propagation under such favorable conditions we could not have expected to harvest but a small percentage of fruit free from their ravages, but with provision for the destruction of this season's winter brood we hope to be at a great advantage over the past season in destroying the pest during the coming year. Your committee herewith exhibit specimens of infested bands and trust that the Act and its regulations with some necessary amendments may soon be adopted throughout the Province by which means it can only be most beneficial. All of which is respectfully submitted.

Signed JOSEPH TWEDDLE,
Chairman of Committee.

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Since writing the within report your committee have met and recommend the following changes in the regulations:—

1st. That clause 1 be amended by adding the following words after the word "Act": "to scrape all rough bark, and all loose bark around wounds, from all the trees mentioned in this clause."

2nd. Also by striking out all after the words "upon all bearing apple and pear trees."

3rd. That the following words be added to clause 3: "also that the bands be removed and all larvæ destroyed between the 15th day of November and the 15th day of April following, each year.

(Signed) JOSEPH TWEDDLE,
Chairman of Com.

Mr. Tweddle moved the adoption of the report, seconded by Mr. E. D. Smith. Mr. Tweddle also exhibited the bands used by him in exterminating the moth.

Mr. G. C. CASTON, Craighurst: What mode do you take of killing them when you find them? Do you pass them through a wringer or dip them in hot water?

Mr. TWEDDLE, Fruitland: We just loosen the band at one end, because if you do not pull it off carefully they will break the cocoon between the bark of the tree and the band. We open the upper part of the band a little in advance of the lower side and break them with a knife or take your thumb to them, which is about the most rapid way.

Mr. MURRAY PETTIT, Winona: The results with me have not been very satisfactory. The Act was not put through in time to get all the machinery in operation early enough, but going though our trees on our first inspection we destroyed from 25 to 75 to the tree, on the later inspection not so many, but our apples were very bad with codling moth. They had been sprayed three times as well; but we cannot expect to destroy them all the first year—it will take a year or two to do it—and it looks to me that killing them in this way is the most certain and practical way of doing it.

E. D. SMITH, Winona: I wish to corroborate what Mr. Pettit has said in regard to our neighborhood. I feel satisfied that the thorough carrying out of this law for only one season will entirely rid the township of this moth. I do not think this season's operations can be taken as a criterion of what it will do, because there were orchards that were never inspected, or if they were the moths were never killed, and if there are a few of those left in a township they nullify nearly all that is done. But there is this fact, that we have slaughtered millions of them. I have slaughtered an average of 100 a tree, and when it is calculated that each of these is capable of depositing fifty eggs, it can be seen what an immense number of apples they are capable of destroying and what an enormous amount of good has been done by our work thus far.

A. M. SMITH, St. Catharines: If neighboring townships do not do this, what then?

E. D. SMITH: There is no doubt they migrate very rapidly, but if they can be subdued in one township it will not be long before the whole Province will take holdof it.

Mr. TWEDDLE: I handled about ten orchards this year, spraying and picking fruit, and we found the work of the moth varies considerably in different orchards. Along under the mountain where it is warmer than towards the lake shore, they did a great deal of destructive work, but as you got to the lake shore there was very little loss in the crop. There were apples destroyed, but only what was needed for thinning out. There was one orchard especially along the brow of the mountain, which lies to the south, and a year ago it had no fruit to amount to anything, having been neglected, but this year it had a heavy crop, there being no moths. In watching this insect I made these observations; that even on the south side, where it is warmer than on the north side, there is more fruit infested with the larvæ than on the north side; and there is more on the outside fringe than on the underside; and I believe that the moth loves heat, and goes to all the warmer spots. That orchard lay to the south and was nicely protected with a row of maple trees on the north side and an orchard on the east side of it, and it got the full benefit of the sun, and I think the moths gathered in there at that season of the year and destroyed the crop.

ALEX. MCNEILL, Windsor: Would the prevailing winds from the orchards on the mountain have anything to do in carrying th moths from the infested orchards there.

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Mr. Tweddle : I do not know. We had another orchard situated just on the same level, which lay to the south, but it was quite free.

Mr. Caston : Is this canvas you have brought here a fair specimen of how you found the moths ?

Mr. Tweddle : We find a great many in our orchards as bad as these, some not so bad. One of these bands was taken off a tree that stood near a pile of apples.

Mr. Caston : I believe this practical demonstration of what is really the best method of fighting the Codling Moth is of great value to the country. Of course in the northern sections the moth is not so bad as in southern Ontario. The Committee will have to get Municipal Councils where orcharding is the main business to take hold and enforce that Act. It will almost be impossible to do it in townships where fruit growing occupies a secondary place. We would be surprised if we had the damage done by this pest to our apples in past days figured up in dollars and cents. A great amount of fruit has had to go into the cull heap on account of these moths. I believe we would run two very important industries together, that is bacon and apples—that is, if the hogs ran in the orchards and picked up any fallen apples, as I believe that in ninety-nine cases out of a hundred the moth is in the apple when it drops. That, in addition to the canvas bands, would almost exterminate it.

T. H. Race : Do you find that this moth makes its way up any shade tree ?

Mr. Tweddle : We find it does not.

Mr. McMichael (Waterford) : I have had experience in regard to bandages around fruit trees. After pretty heavy rains in the spring we go through the orchard and scrape off all the rough bark down the trunks and we take an old carpet and tack one end there so that it will be permanent, and we have a claw hammer to pull that out and destroy the larvae and tack it back again. Then we leave it until fall and destroy all the later brood. My experience has been that these moths do not travel from one orchard to the other very extensively. I know of an orchard just to the east of mine, when we take ours off pretty clean we do not have them to come back very much in the other. Of course they do travel on the wing from one orchard to another to some extent.

Mr. McNeill : Mr. Ellwood of St. Thomas, an apple buyer, tells me that he hunts the country for the hog orchards, and usually finds that where the hogs are allowed to run he can get a good quality of apple comparatively free from Codling Moth. That corroborates what Mr. Caston said.

Mr. Tweddle : I had two orchards side by side last year. In one the pigs ran and the other they did not. The first was twice as bad as the second. There may be other causes for it. I think pigs running in an orchard a good thing. Will Mr. McMichael tell us how often he changes his bands ?

Mr. McMichael : Every twelve or thirteen days during the early part of the season, and the last crop we leave until the apples are all taken out of the orchard.

Mr. Tweddle : I believe the President put three bands on a tree a year or two ago, and another of our neighbors did the same thing this year and found just as many larvæ in the upper band as in the lower, and as many in the upper and lower as in the middle.

Mr. McMichael : It is generally conceded in our experiment stations that one-half of the larvæ leave the apple before it drops, consequently the pigs would not get those, but having the stick in our bands we get a large percentage of the larvæ.

Mr. Tweddle : The larva goes down on a web in the night and curls up, so the stick would likely not get it.

Mr. Hunter (Scotland) : I have found them going up as well as coming down. I found them, when they had not matured thoroughly in the apple, go up the trunk again and go into another apple. Perhaps you think that rather strange, that they should go into the second apple, but the larva goes into the first apple at the calyx end through a very small opening, but the second time it goes in through the side.

Mr. McNeill : Are you perfectly certain about them entering the apple ?

Mr. Hunter ; I saw them going up. It was mostly at night. I saw them crawl up the limb. They leave a web as they go. They enter the side of the apple. They get a leaf near the apple, they cut the leaf and make their way into the side of the apple and destroy the matured apple—one of the very best generally.

Dr. Saunders (Director Experimental Farms, Ottawa) : I should want to see it myself to be quite sure of it. It is well known to be the habit of the second brood of

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moths to lay their eggs on the sides of the apples. I would not be prepared to dispute the statement at all, because there is so much we do not know about all these things we are always open to receive information from everybody; but it is one of those conclusions that I should think would need a good deal of proof, because it is so contrary to the experience of all of us who have watched these insects from the beginning of their lives to the end, and I have never before heard of an instance of a larvæ leaving the fruit that it occupied until it was full-grown. It is possible, however.

Mr. HUNTER: As soon as the seeds are fairly cut or destroyed the fruit ceases to develop, and shrivels up, and that sometimes takes place quite a bit before the larvæ is full grown, so it must have something else to feed upon before it gets full growth. That is why I watched them.

Dr. SAUNDERS: We find some fruits that are seedless that complete their growth and get full size, such as seedless pears and oranges, so that the presence of the seed is not an actual necessity to the growth of the fruit surrounding it, though we commonly think the presence of the seed importance to the growth of the apple. I know that the growth of the larva at that season of the year is very rapid, and an egg laid on the side of an apple would produce a larva that will enter right to the core and destroy the seeds in a very short time, so that the finding of the larva in the apple later in the season, and seeing evidence of its having entered from the side, is not to my mind proof that the larva was partly grown when it entered. In most cases I think it would be found that the larvæ were from the eggs of the second brood of moths.

The PRESIDENT: Were these larvæ apparently full grown?

Mr. HUNTER: Nearly so. I would remark that a larva just hatched from an egg does not make a large hole, but these that I speak of are large. Another thing is that the leaf is glued over, and I doubt very much whether any of them enter from the side at first at all. The way I have seen them generally enter is in the calyx.

The SECRETARY: It would be well if those who have experience would give us some idea of the cost of this work before we vote that this be adopted in different localities.

Mr. ARMOUR: I see Mr. Tweddle reported that felt paper could be used in place of burlap. This would be cheaper than burlap.

The SECRETARY: Perhaps it would not be so good.

Mr. ARMOUR: I think just as good.

The PRESIDENT: It is not so durable.

Mr. ARMOUR: But you have to change every two or three weeks, anyway.

The PRESIDENT: Burlap will last for years.

The SECRETARY: I understand the gentlemen who have been trapping this insect with bands have had to kill each moth individually with a knife. I would like to ask if there is not a quicker way of doing it?

Mr. CASTON: We have heard two ways suggested—one by dipping the bandages into hot water, and the other by running them through a wringer.

Mr. TWEDDLE: It won't work at all. So many larvæ are between the trees and the bands that they drop out; then you have to hunt them out. I can get felt paper at just the same cost as the burlap, two and a half or three cents a pound; that would be about a cent a tree, or forty-five cents per acre for the burlap. It would cost about a dollar an acre for the work of the whole season. A man will go over an acre in an hour if he only gets 8 or 10 or 12 larvæ to a tree; but if he has fifty or a hundred it will take him two hours.

Mr. MCKINNON (Grimsby): I found it took about half a day to the acre. I had sometimes as many as sixty or seventy under one bandage, and in a couple of weeks more there would be as many again.

Mr. TWEDDLE: It is not a great cost at any rate. It would make the cheapest method of destroying them.

Mr. MCKINNON: It cost me three dollars for two acres this year, and I counted nothing on the burlap because I had fertilizer bags that I cut up.

Mr. TWEDDLE: It would not exceed $2 an acre unless the trees were very large and the larvæ numerous. After you get the burlap it will last three or four years.

A. M. SMITH: I received a circular the other day from an enterprising Yankee who has got out a band made of fine wire that he claims is going to do the work and last several years at a cost of two or three cents apiece,

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Mr. McMichael: My experience is that the moths are very loth to come under bands that let the light through. A wire screen would have that tendency.

Mr. Tweddle: That has been my experience. White cotton is no use; they won't go under it. They seek a loose bark first, it is better protection from the light. With regard to that scraping, I don't find many larvæ around the loose bark where there were bands on the trees, but we did find numbers of them where a piece of thick, loose bark, dead or even alive, was hanging around the edge; it would seem to be greater protection and they would go in there even though there was a band on the tree we would find great numbers of them. That is the reason we suggested that the bark be scraped off around the band.

E. D. Smith: My experience of the last two years is that the cost of destroying them will not exceed fifty cents an acre.

The President: Does that include bandaging for the first time?

E. D. Smith: No, killing them off.

The motion to adopt the report was carried.

REPORT OF THE COMMITTEE ON TRANSPORTATION.

Your Committee on Transportation beg leave to report as follows:—

That owing to the advance in the price of all kinds of material entering into the construction and operation of the railways of this country; on January last, the railway companies withdrew and abolished all special rates and concessions. Amongst these was the arrangement entered into by your committee with the Canadian Joint Freight Association, whereby grapes in carloads had been carried during the season of 1899 at a reduced rate.

Your committee therefore met together early in the year and canvassed the situation as thoroughly as they were able, with the time and information at their disposal, and decided to present the following memo. of requests, through the Joint Freight Association, to the various railway companies, for their consideration, that is to say:—

1. Restore last season's special, making it apply to mixed fruits in carlots, to all destinations in Canada.
2. Make mixed fruits in 5 ton lots to one consignee, third class.
3. Make mixed fruits in ton lots, to one consignee, second class.
4. Place apples in barrels in carlots for shipment in Canada, eighth class.
5. Grapes in barrels, or large baskets, for wine purposes only, fifth class.
6. Encourage the export of fruit to the British market.
7. Devise means whereby a better distribution of fruits by freight in Canada may be accomplished.
8. Where refrigerator cars are iced en route, actual cost only to be charged.
9. Permit barrel apples in mixed cars to carry the apple car-load rate.

To which after very mature deliberation, the following reply was received in June last, viz.

1. From points west of Toronto to Toronto and east thereof, also to points on the main line of the C.P.R. east of and including Pembroke, on the basis of fourth class for grapes C.L. Mixed cars of grapes and other fruits, including apples in baskets, crates or boxes, to be on the basis of fourth class for the grapes, third class for the other fruits and fifth class for the apples in barrels. Minimum weight for mixed cars containing apples in barrels, 24,000 lbs.

2, 3 and 4 declined.

5. Straight carloads of grapes in bbls. from and to above named territory to be fifth class C.L., minimum 24,000 lbs.
6. The Canadian lines to give all reasonable encouragement to export traffic.
7. The railroads to give all convenient despatch to shipments of fruit by usual way freight trains.
8. Cost of ice to be made as reasonable as circumstances will permit.
9. Provided for in No. 1.

The foregoing practically means that the concession granted in 1899 be restored an dthe additional arrangement granted whereby mixed cars of basket and barrel fruit would be carried at their respective carload rates with a minimum of 24,000 lbs.

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The committee felt that the entire list of changes as asked for were not unreasonable, and would if granted result in furthering the distribution of the large output of fruit that was at that time in prospect. The experience of the season which has just closed has shown that the efforts of the committee have not been without advantage to such fruitgrowers and shippers as have been in a position to avail themselves of the privileges secured.

It must be borne in mind that the R. R. companies are exceedingly averse to make any changes in their rates for quantities less than carloads, and the most feasible way for shippers to help themselves is for a number to unite together and where possible to ship in carlots, thus getting better rates and usually much greater despatch.

There is still a lamentable lack of proper cars to handle the fruit crop to best advantage; during the past season there has been considerable loss to shippers through improper cars and delays in transit by freight, and through bad handling and overloading cars by express.

As the fruit output increases it will be the duty of this Association to bring what pressure to bear it may be able, to impress on the transportation companies the advantages of catering to this trade.

With reference to ocean transportation, your committee have no data as to what improvement, if any, has been made in that respect, although we are glad to note that great success has characterized the shipment of tender fruits to England during the past few months. You will however no doubt be favoured with full particulars of these shipments before this meeting is over.

We cannot close this report without referring to the courteous and attentive manner with which your committee was received by the railway officials and their manifest desire to be informed of the needs of the fruit trade.

All of which is respectfully submitted.

WM. H. BUNTING,
Chairman of Committee.

Mr. BUNTING, after reading the report, said: Personally I feel very much pleased with the result of the work of the Committee. We have not accomplished all that we would like. We have not had our requests granted as fully as we would like to have had, but the fruit industry has been brought to the attention of the chief officials of the various roads and it is encouraging to observe the attention that was given to the matter, and to know the desire of the railway people to help us if we can show it to be to their advantage. We must be able to bring to them a business that is worth their while taking hold of. We must be able to show them from time to time that not only the wants of the trade are urgent, but that the advantages to the roads would be great, and that is the best argument that we can bring. The only way that we can get that, it seems to me, is by co-operation in the various sections, and if the Committee appointed to carry on this work could get the information showing the wants of the various sections and the disabilities under which they are laboring, so that the matter can be brought intelligently and properly before the railway people, I believe that there is a possibility of vast improvement in this respect. I have very great pleasure in moving the reception of this report.

Mr. MCNEILL (Windsor): I would second that motion, and at the same time say a word or two in reference to the importance of this work. Here is a place, it seems to me, that this Association is called upon to do something, and if we wish to keep up the traditions of our Association here is a line along which we can work, and work successfully. While we ought to be pleased with the success we have attained, it is simply on the ground that we ought to be thankful for small favors when we can get no more. Certainly the concessions are greater than I thought the committee could get from the railroads, but they are nothing like what we as business people deserve from the hands of the railway companies. This transportation question is one of the greatest obstacles to our trade, and very little progress will be made until we have better transportation than we have yet. The concessions they have made are not at all yet what they should be. We are discriminated against as fruit growers particularly. We are hampered in our business. We could increase largely our business if our freight rates were more favorable. This Association, I think, can look back over a long career of usefulness in the matter of educating the public along the line of growing fruits. That, I think, is conceded on all

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sides. It has done a noble work, and those that have gone before us deserve every credit; but the production of fruit in this Province has reached such a stage that we more than supply our own markets, and there is a glut at almost every point of production, while there are other parts suffering for it. Mr. Whyte, the gentleman who has charge of the pork packing establishment in Seaforth and Stratford, told me in the presence of Mr. Race that for a basket of grapes which we were glad to get 11 cents for at the most—10 cents usually—they would in the same season have paid 50 cents for in Brandon. Another gentleman from Calgary told us that they paid $1 per basket for exactly the same basket that we were glad to get 11 cents for. There was some of that for the middle man, but the larger part of that was for the freight. Such instances could be multiplied a thousandfold to show that, while there is a glut at the point of production, there is a scarcity that reduces consumption on account of freight rates. We are discriminated against as fruit growers. Take grapes alone. While a carload of wheat coming down from Manitoba can be brought here for between $40 and $50, these very cars go back during the month of September—just when we are sending our fruit up to Manitoba—these cars go back empty in train loads. And these are the very cars we like to get on account of their having a window at each end and having a draft through that is equal to this celebrated cold draft that is so desirable on board ship. With those grain cars we could get the very conditions desired, and yet if we ask to have one of those grain cars filled with grapes—of not as much value as the carrying of wheat that came down in the car—they ask us not $40 or $50, but nearly $100 to send the car back. There is no sense nor reason in that. We use the car for a shorter period of time—load it and unload it quicker. We can go around the whole range of fruit and find the same difficulty. Shipments of stock would illustrate the discrimination. We are also discriminated against as Canadians. An American can ship fruit into this country and get a cheaper rate than we can. My friend, Mr. Boulter, can go down to the county of Essex and barter there for a carload of peaches. All we can say to Mr. Boulter is, "We have the peaches here; you want to can them." He offers a certain price and we refuse that, and he can go to Grand Rapids, Michigan. There is a duty of 50 cents a bushel on the peaches coming into Canada, but he says, "I will get a freight rate from Grand Rapids to Picton that is cheaper than your rate from Leamington to Picton." That is only one matter of discrimination as Canadians. They will haul American fruit cheaper than Canadian fruit. That can be multiplied in a thousand instances. Then again, the freight rate on the American side is positively cheaper—not relatively—than on our side. For instance, I can go to Detroit and get a rate of 19 cents per hundred pounds from Detroit to Chicago, whereas if I want to go to the nearest market we have to the east of us—that is London, about half the distance—they charge me 32 cents per 100 pounds, proving clearly that this whole matter of freight wants to be reconsidered. I am very much surprised that there was not one point taken up here. We are to be congratulated in having one on the committee who takes so much interest in it and has worked so hard and faithfully as Mr. Bunting, but he will remember how the railway company talked to us. He will remember no one could be more polite. Why not? They were getting everything they wanted; what temptation was there to be anything but polite? It appears to me I would be good natured myself if I were getting a few hundred dollars a day out of the party to whom I was talking; it is a first-rate lubricator for geniality. We had nothing to complain of on that score at all, but this I noticed: that in all their questions, and in all the arguments we could use to them, the only question they cared about was: "How much are you getting out of this thing?" "Why, you are looking well and hearty and hale, you do not appear to be suffering over this business"—they would say to us—"what do you want a cheaper rate for?" "We want to make a little more money." "Oh, you get three meals a day, and dress fairly well." Everything they inquired into was how much we were making out of our freight; and it appeared to me that as long as they felt that we were getting anything out of it at all, then just so long they were not able to make concessions. Take in this matter of grapes alone; we got that concession largely because we put before them these facts: that if they did not make a concession there, the grape industry would go down, in certain parts of the country anyway—and it did partly on account of frost—but it will never be revived again on account of the freight rates. They did not ask for one moment as to the actual cost of carrying the stuff. The facts that I have cited here discriminating be-

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tween fruit and other productions show that they do not enquire into the actual cost of carrying these things, but they simply enquire into what they can get out of the business—as they call it, "How much the traffic will bear." To put it in another way, they simply stand in the position of people who can squeeze the public, and they squeeze just to the extent that the fruit growers can live in this case. All their arguments and questions are along the line of finding out how much they can take from the average farmer and have him live, and they will fix their freight rates just at that. They argue that the farmer and fruit grower who is above the average will make a good thing, and they try to devise methods by which they can get at his surplus, leaving the fellow under the average to drag out an existence and work sixteen or eighteen hours out of twenty-four so as to make up for his want the other way. The railway companies, as they are organized at present, are in a position to hold the same relation towards commerce in this land that the old barons four or five hundred years ago held upon the banks of the Rhine, when they built their castles and by force of men and muscle could exact from all who passed their doors a certain tribute. To-day they use brain, not muscle, and they say because they use brain they are entitled to all they can get out of it. Now, my opinion is we must get together and match them either in brain or muscle. I do not say that it is any more honorable to steal by strength of muscle than by force of brain. That is an ethical question I cannot discuss here. A careful investigation has convinced me that the railways are in a position to take just what they will out of the traffic; and when we go to them we have nothing to offer them except, as Mr. Bunting very honestly put it, that we can do something for their interest. It is only when we can show that we are working in their interest that we can get any concession at all. I say that it is not the proper position to be put in. We are the people who are making the wealth—they are simply conveying it; and while I am perfectly willing that they should get a fair recompense for the work that they do, I say it is a shame and a scandal on the fruit growers here that they should stand without protest this condition of affairs, by which the railways can take exactly what they please and we have no remedy in the matter. We ought at some stage of our proceedings to do what we can to remedy this state of affairs. The only way I see is for us to join with the other bodies of intelligent farmers who are gathering throughout the country and asking the Government to take this matter into consideration and at least appoint a Commission to investigate the whole affair and endeavor to get at some solution of this transportation business. It is the only remedy that I see. It is a step in the right direction. It will not be solved within the next one, two, five or ten years; indeed if it is solved within the next fifty years we may be thankful, but it has to have a beginning. I will second this motion and pass the report, at the same time congratulate the Committee on the success they have had, and move this resolution at a later stage of the meeting.

Mr. McKinnon: Mr. A. M. Smith and myself move that the report of the Committee be amended by adding this: "That in the opinion of this Association the time has arrived when a Railway Commission appointed by the Dominion Government should be given full power to regulate freight and passenger rates upon an equitable basis."

Mr. A. H. Pettit: I want to make one remark in regard to the report. While we are expressing ourselves as pleased with the change in the classification rate as being in our favor, if you will notice, the rate before was on 20,000 lbs. Now, with a lower rate and classification we have it put at 24,000. Now, 24,000 is too much for any car to carry of perishable fruits. The grower views it from this standpoint: we are getting a lower rate, but a 24,000 lb. car will not hold it; it is impossible to put 24,000 lbs. of grapes in our cars to-day and ship them with any kind of success. The grower will come out with damaged fruit. So that really the reduction is not so great to the grower at least, and the railway company will get the same amount they got before, because they will make you put 24,000 lbs. in instead of 20,000. I think that should be changed. I say 20,000 lbs. is enough for any car to carry.

Mr. Bunting: I think a little explanation will be necessary. The minimum of 24,000 lbs. in the report refers to carloads of freight only when barrel packages are placed in cars, barrel apples or grapes. The minimum for basket freight still remains at 20,000 lbs. Of course that is regarded this year as somewhat of a hardship, where it was desired to put in a few packages, but after that grew up it resulted in raising

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the minimum from 20,000 to 24,000. The report is necessarily somewhat technical in reference to classification, but I might say that the reductions that were asked by the Committee were equivalent to about 20 per cent. of a reduction upon the ordinary rates that had obtained heretofore. With reference to grapes that was practically the only concession that was given—a reduction of 20 per cent. for grapes only in basket lots.

Mr. W. BOULTER (Picton): Did you get a yearly rate from the Traffic Association?

Mr. BUNTING: This rate obtains until it is cancelled, I presume.

Mr BOULTER: Are you positive they will not raise the rates up on you when the winter comes on?

Mr. BUNTING: Yes, rates go up.

Mr. BOULTER: The next time you go before them, ask for a yearly rate.

Mr. CASTON: I think we might sum up the situation in this way: We have practically only two railways in this country; they are competing for the through traffic to the seaboard, and discriminate in favour of the Americans and against the Canadian, and about the only solution that is offered is either Government ownership or a Railway Commission. I believe this resolution is along the right lines, and although we may get some minor concessions we will never have radical change until we have either Government ownership or a Railway Commission with power to settle these matters.

Mr. J. M. SHUTTLEWORTH: I have some bills of lading in my possession through St. Louis to Liverpool via Montreal, and I also have some of the same date from different points in Huron and Bruce, and the freight from St. Louis to Liverpool via Montreal over the Grand Trunk was actually a little less than the freight from points in Huron and Bruce to Liverpool. That is hauling over the same road.

Mr. E. D. SMITH: I can point out a similar glaring case of apparent injustice. The freight rate from here to St. John's, Newfoundland, by way of St. John, New Brunswick, is less than from here to St. John, New Brunswick. We have known of all these cases of injustice for many long years, and have frequently gone before the Traffic Association. As long as I can remember the injustice of the railways has been agitated, and we have got nothing. I was a member of this Committee that was before the Traffic Association last year, and I can assure you that Mr. McNeill's description of the way that it was received the year before has just about hit the nail on the head. They are just as courteous as they can be, and they get you out after your interview in as short a space of time as they can without offending you in any way, and they throw a little sop or two—as you will see we have got something—which does not amount to much. I think, as Mr. McKinnon's resolution states, the only remedy we can ever expect will be Government supervision of the rates of railways. The railways are going to fight, it is their business to fight, to get all out of the traffic they possibly can. They just figure the thing up how they can get the most money out of it, and if they think this freight is going to be carried anyhow, they charge as high as they can for it. There are only two railways in the country, and they have practically agreed on rates, and so there is no real competition. I feel like supporting the resolution.

Mr. MCNEILL: They have not only agreed on rates, but they have the thing fixed against their own selfish greed so that they cannot cheat each other. They have actually got the mechanism down so fine that one cannot cheat the other, and they just go into it on that score. They have got this Traffic Association business around them so nicely fixed that, although in years gone by they did attempt to cheat each other, now there is no competition or chance for it. The Secretary of the Manufacturers' Association recently received a letter from the Department of Railways and Canals stating that the Association would be consulted in future before new rates schedule issued by the Railway Companies were approved. You are all aware that the Railway Committee of the House has control of these rates. It does not amount to a hill of beans. They can do as much as a Commission will do, but we don't expect them, and they never will; nevertheless they have nominal control of these rates. They nominally assent to all the rates. Now, there is a concession to the manufacturers. If you will just take the statistics, as I took the trouble to do a few years ago, you will find that our business far exceeds theirs in the amount of money invested, in the number of people engaged in it, the value of the annual product, and in everything that should constitute a business; nevertheless they are consulted and we are not.

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Mr. McKinnon's motion was put and carried unanimously.

The SECRETARY: I would move that this Committee on Transportation be continued during the coming year, and exert themselves still farther in our interest. The names of the Committee are: W. H. Bunting, St. Catharines; A. H. Pettit, Grimsby: E. D. Smith, Winona; T. H. B. Carpenter, Winona; A. McNeill, Windsor.

Hon. JOHN DRYDEN: I have had some experience in dealing with these railway men in connection with some other matters, and I quite agree with what Mr. Boulter has said. There is only one way you can approach the railway authorities, and that is, if you can show them that by a change in the rates they can increase the product of the country, or in any way take such a course as will tend to advance the interests of the railway, they will listen to you; but if you go to them and say in effect, "If you change this rate I can make so many more hundred dollars a year than I do now," they will just smile and look pleasant and go on with their business and pay no attention to it, for they are sharp enough to see your argument. A few weeks ago, in Montreal, we got considerable additional concessions in live stock in this country, but it was along the same line. I used my best endeavour to put my arguments so as to show them that we were going to increase the trade of the country, increase the production of the country, which, of course, meant adding revenue to the railway.

The SECRETARY read letter from Mr. Thos. Beall of Lindsay, regretting inability to attend, and suggested that it be referred to the committee on resolutions; he also read letter from W. E. Wellington of Toronto, regretting inability to attend. He then said: We have received invitations for next year's meeting from several places in addition to those named this morning. We have one from the Horticultural Society of Belleville, and one from the city clerk of Belleville, also a personal letter from Mr. Reid. I suppose you will refer these letters to the Directors for consideration with the others to-night. I have a letter from Mr. Hamilton, Grenville, P.Q., regretting his inability to attend, but he is mailing documents to Dr. Saunders, one regarding the Canadian exhibit of fruit at the Paris Exhibition, 1900, the other on Horticulture in France.

REPORT OF COMMITTEE ON NEW FRUITS.

PRESENTED BY PROF. H. L. HUTT (ONTARIO AGRICULTURAL COLLEGE) GUELPH.

The duties of this committee are to be on the lookout for anything new in the line of varieties of fruits. Any new and valuable fruit which may be brought to our attention we are glad to take careful note of and report to this association. I think it a somewhat remarkable fact that the greater number of our best varieties of fruits are of chance origin, such as the McIntosh Red and others. Of course we have had and still have men who have done valuable work in the raising of fruit by cross fertilization. The late Charles Arnold, of Paris, has given us the Ontario, one of our valuable winter apples, and our friend, Dr. Saunders, has done much for us in that line. but still there is much more that might be done in the way of improvement in our cultivated fruits. We have not reached perfection by any means, and there is room for valuable work along this line. The number of fruits that have come before us this year has been rather small—smaller than usual—and a great number of them are hardly worth mentioning. Some of them are promising. We have given more extended descriptions of the more valuable of them.

The object of this committee on new and seeding fruits is to be on the lookout for any new seeding which may give promise of value and report upon the same to this association.

It is a somewhat remarkable fact that by far the greater part of the fruits now cultivated are of accidental or chance origin. Nature has produced them and man has discovered and adopted them. For every one, however, which has been considered worthy of adoption and propagation, thousands have been produced which were of little value and received no attention.

There are a few men in our own country and in the States who are doing careful work in the raising of new fruits by cross-fertilization and following out the principles of plant breeding. The names of such men will no doubt remain in the annals of horticul-

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ture; but there is still room for valuable work along this line. We have not yet reached perfection, and there will probably always be room for improvement in the different classes of cultivated fruits.

The number of samples which have come before the notice of your committee this year is smaller than usual, but among them are a few which give promise of value. In the following notes, brief mention is made of the varieties which have been received, and those of promise are more fully described:

Seedling Apples.

No. 1. The Russell apple.—The origin of this variety, which has been fruited at the Central Experimental Farm, Ottawa, during the past five years, has been furnished by Mr. J. P. Cockburn, Gravenhurst, who gave it its name. He says it is a seedling supposed to have originated with a Mr. McRae, of Russell County, from seed brought from the Niagara district. Mr. Macoun gives the following description of it, as it had been fruited at Ottawa:—

"Medium to above medium in size; skin pale yellow, almost completely covered with deep red; very handsome; a few gray dots but these are not prominent; stem long and slender; cavity shallow but open; calyx closed; basin shallow and slightly wrinkled; flesh white, tender, melting, juicy, subacid with a suggestion of Fameuse flavour but slightly astringent; core large; skin thin and tender; quality good. Ripens unevenly from August to middle of September. This is the best table apple of its season which has been fruited at Ottawa. It may not prove valuable commercially on account of its uneven ripening, but it will be very useful for home use.

No. 2. A seedling apple from J. Ryerson, Orillia, Ont.—On this variety Mr. Woolverton has made the following comment:—(*Canadian Horticulturist*).

"This is certainly a most attractive looking apple, almost equal to the Gravenstein in appearance, and of a season to continue its use from the time when this variety is over in October throughout November and December. In form it is oblate with deep russeted cavity and large deep basin. The skin is straw colored background, almost covered with stripes and splashes of bright red. The flesh is white, fine, juicy, of an agreeable aromatic flavour. This is a promising apple."

No. 3. Seedling from G. H. Caughell, Aylmer, Ont. Medium sized, yellow, sweet summer apple.

No. 4. Seedling from Miss Orgill, Glen Orchard, Simcoe county, Ont. A small red, crab like apple of rather poor quality.

No. 5. Seedling from W. H. Lambert, Vanbrugh, Ont. Medium-sized streaked autumn apple, of fair quality.

No. 6. Seedling from Alex. Skinner, Lindsay, Ont. Large, red, above medium in quality, ripening in autumn.

No. 7. Seedling from A. Clifford, Richard's Landing, St. Joseph Island, Ont. A large handsome apple, somewhat resembling Ben Davis, of only fair quality, but may be useful, on account of its hardiness, in the northern sections.

No. 8. Seedling from J. P. Cockburn, Gravenhurst, Ont. Medium-sized apple, splashed and washed with bright red on sunny side, quality above medium.

No. 9. Seedling from Wm. Sprendborough, Bracebridge, Ont. A small, red winter apple called Willen, of good quality, may prove of value in the northern sections.

Seedling Pear.

A seedling from Robert Marshall, Snelgrove, Ont. A medium-sized handsome pear with bright yellow skin and red cheek. A chance seedling, supposed to be a cross between Anjou and Louise Bonne. The flesh, however, is as tough as a turnip, although the flavor is superior to that of Keiffer. This pear could no doubt be shipped successfully to the ends of the earth, and would in all probability keep long after reaching its destination. Some have suggested that it might be profitable for shipment to the Old Country market because of its handsome appearance and long keeping qualities, but we do not think it advisable to propagate a variety with which no shipper would dare allow his name to appear.

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SEEDLING PEACHES.

No. 1. A seedling from W. E. Wellington, Toronto, Ont., grown in the City of Toronto. Upon this variety, Mr. Woolverton makes the following comment:—

"This seedling measures 3½ in. in diameter and weighs one-half a pound. The flesh is yellow, juicy, and excellent, and quite free from the pit. We know of no peach of this season to compare with it. We have finished Elberta, Late Crawford, Steven's Rareripe, and Longhurst, and are now gathering Smock and Winter, but these latter are small compared with this fine sample."

No. 2. A seedling from Thos. H. Lewis, Jarvis, Ont. A large handsome peach, very much resembling early Crawford, but a little more highly colored.

SEEDLING PLUMS.

No. 1. A Japan seedling of Luther Burbank's, grown at W. W. Hilborn's, Leamington, Ont. This is another of Burbank's promising Japan plums. It resembles the Burbank in size and appearance, but is two or three weeks later in ripening. The tree is thrifty, vigorous, and very productive.

No. 2. An American plum, a seedling of Wolf, raised at the Central Experimental Farm, Ottawa, Ont. In this connection, Mr. Macoun has given us the following notes:—

"A large number of seedling American plums have been grown at the Central Experimental Farm, but none have proved superior to some of the named varieties. This year, however, one fruited which will probably prove a valuable acquisition. The fruit is very large, roundish, firm. color deep but lively red, very handsome. Bloom moderate. Suture merely a distinct line. Flesh yellow, juicy, sweet, rich. Stone large with flesh clinging to it. Skin thick and tough; quality very good. Ripens last of September. Tree vigorous. Where late native plums are desired, this should prove valuable."

SEEDLING GOOSEBERRIES.

Three very promising seedling gooseberries were received from Mr. C. L. Stephens, Orillia, Ont., who has been giving considerable attention to the growing of seedling varieties.

No. 1. A seedling of Industry; fruit large like Industry; and so far has proved free from mildew. Promising.

No. 2. A large greenish white berry, very much resembling Whitesmith. Promising.

No. 3. Medium sized green berry resembling Downing.

No. 6. A large handsome berry resembling Whitesmith in size and shape, but of a bright yellow color. Promising.

H. L. HUTT,
L. WOOLVERTON, } Committee.
W. T. MACOUN,

Professor Hutt moved the adoption of the report, which was seconded and carried.

Dr. SAUNDERS: I would like to make one remark in this connection. Prof. Hutt has told us about the Keiffer pear that the flesh is as tough as a turnip, and it might do for shipping. I was in the Covent Garden Market when I was in England, and one dealer said, "We used to get good prices for these Keiffers, but we can hardly sell them now." It is very evident they are being gradually educated to appreciate good pears, and I do not think it would be well for us to encourage the exportation of anything that we are not prepared to eat ourselves. (Hear, hear.)

Mr. MORRIS (Fonthill): I would suggest that the Committee on New Fruits carry their work a little further. It is of very little benefit to report on a seedling that they find in Canada, because in five years, perhaps, they would not find one of sufficient merit to be propagated. What I would suggest is that they examine all new fruits offered by Americans, by all nursery men, wherever they find a catalogue offering us something new as a specialty, that they write to them and get a sample of the fruit and report on that, and then we will have a report so that by the time a nurseryman gets to selling those

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trees in this country, the people will be in possession of the facts as to the value of those fruits. I think this would add very much to the value of their reports.

Prof. HUTT: We would be only too pleased to extend our work in that line if we could get hold of the new varieties sent out by American nurserymen, which is a difficulty. Of course we will have them after a time at our experiment stations. Mr. Burbank is willing to send along anything he has, and we would be only too pleased if the Americans would send over their new fruits and let us try them. I think sometimes our work is not known enough. If the people knew that we were on the lookout for things of that kind, and that these things always come before our Association and are taken care of, they would be more inclined to send in anything on that line. Can you suggest, Mr. Morris, any way we could get hold of those American varieties?

Mr. MORRIS: I suggest you get hold of the American lists and send each one a card asking them for their catalogues, and see what they have to offer.

Mr. WHITNEY (Iroquois): Some fruits have been highly recommended by the Committee Is it the usual course to have these fruits tested more fully by our Experimental Stations? I think we ought not to drop it with the mere report, but carry it on to the Stations and have them further tested.

L. B RICE (Port Huron, Mich.): As far as our nurserymen are concerned, any who are propagating a good fruit would undoubtedly send samples to your Committee upon writing to them, but if it is a fruit that they are ashamed of they won't send it to you and you might just as well report against it on the start. We are fairly honest (laughter) and we are getting more so, as are you (laughter), and when we find anything that is not good for you we will not send it to you, because we are afraid you will get posted up too well.

Mr. SHERRINGTON (Walkerton): We ought to trace them up for a few years to see if they hold out.

The PRESIDENT: That would be very much enlarging the work of the Committee, and I think when the propagators of these fruits see the report of the Committee, that will give them some idea whether it is worth while going on trying to propagate or not. It appears to be all that we can do at present.

E. D. SMITH: Something might be done in the line suggested by Mr. Morris. When a new grape, like Campbell's Early, was first introduced, samples of that fruit could be sent to the Committee and they could report as to quality, size, bunch and berry and so on, and a good deal of information could be got in that way.

The PRESIDENT: I think Mr. Morris' suggestion will be accepted by the Committee, and anything that can be done in that way will be done.

Prof. HUTT: If any new varieties are promised we will try to get a scion of it at Ottawa and Guelph, and if anything comes of it we will let you hear further.

EXPERIMENTS IN FRUIT GROWING AT THE CENTRAL EXPERIMENTAL FARM.

BY PROF. W. T. MACOUN, EXPERIMENTAL FARM, OTTAWA.

It is a great pleasure to have this annual opportunity of meeting the representative Fruit Growers of Ontario. By coming to this meeting I get many hints which are useful to me in my work, and which will enable me better to forward the interests of the fruit growers of Ontario and the Province of Quebec. I can assure you I am very glad indeed to bring before you the results which we are trying to achieve at the Experimental Farm, because, as you know, the Farm is being supported by the people of this country, and it is only right that our work should be brought before you so that you may pass judgment upon it and offer any suggestions that you think necessary. The work was begun in the Horticultural Department of Central Experimental Farm in 1887, when Mr. W. W. Hilborn was Horticulturist. He began the orchards there, and continued in this work until 1889. In the spring of 1890 Mr. John Craig, the late Horticulturist, took charge and continued in that position until the autumn of 1897, and in the spring of 1898 I was appointed to take charge of the work. Mr. Hilborn began planting in the autumn of 1887. The farm began to get cleared, and he had a large stock of fruits on hand and he

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was anxious to get an orchard started, so he planted out a limited number of varieties that autumn. The experience which was had that winter demonstrated quite strongly that it was not wise to do any fall planting in districts such as that at Ottawa. A great many trees died, and our experience with fall planting since, which we have done in a very limited way indeed, goes still further to demonstrate the ill effects from planting in the autumn. The wood of the trees seems to dry out, and they become more easily injured by frost. They are also liable to be heaved. It was not until the spring of 1888 that the main part of the orchards were planted, and during that year a very large number of the standard varieties and many of Russian origin were brought together, and every year since that time the number of varieties has been increased so that now we have about 700 kinds of apples growing in Ottawa. The main object in testing fruits at Ottawa was to determine their hardiness, productiveness, quality, freedom from disease and other points. Then in connection with this we were to try experiments with different methods of culture, different methods of spraying, etc. We have been trying to carry out all these different branches of work at the same time. The conclusions we have reached are that there very few varieties of apples indeed which are quite suitable for the Ottawa district. Out of the 700 varieties that we have growing, there are probably not more than a dozen which kill back at their terminal branches, so that we are not troubled with winter killing above ground, but the two principal causes of death among the trees are sun scald and root killing, and the third cause I may mention is blight, so that the apples that will withstand the sun scald, root killing and blight are the varieties which will succeed in Eastern Ontario and the Province of Quebec. As I said, we have only a very few apples which we could recommend. We have tested about 200 varieties of the so-called Russian apples, but outside of their usefulness for growing in the most northern parts of the country the newer varieties of Russian apples have not proved of value. Of the older fruits, of course the Duchess of Oldenburg, Red Astrachan, and Yellow Transparent are the three very good apples for their season. The varieties of apples which we have found from experience to be the best suited for growing in districts such as that at Ottawa are, for summer, Yellow Transparent and Duchess; for autumn, Wealthy; very early winter, McIntosh Red and Fameuse, where it can be grown with natural protection. We find that where we are at the Experimental Farm somewhat exposed, it does not do very well, but in the vicinity of Ottawa where it has some protection it does very well indeed. Then for the late winter we recommend Scott's Winter, Gano and Pewaukee, and also Salome. The other varieties which are perfectly hardy are Lawver, Golden Russet and Ben Davis. The Salome was originated in the States, and was one of our most promising apples; this one shown here was grown in Western Ontario; you will notice its color is yellow while the one grown in Eastern Ontario is red. That is certainly Salome, but they were not highly colored this year. I may say that the Salome is a very productive fruit and quite hardy. The quality I might also say is good; it is not high-flavored, but it is juicy and pleasant to the taste.

Mr. Caston: Do you find the tree a thrifty grower?

Prof. Macoun: We have found them a thrifty growing tree. This is a McIntosh Red, which as you know was originated fifty or sixty miles from Ottawa. This we consider one of our most valuable apples, and for its season, the most valuable apple that we have growing in Ottawa. Fruit growers are planting very largely of this variety every year, and I think it is going to be one of our leading dessert fruits. Complaint is often made that this apple is a shy bearer, but we have not found it such at the Experimental Farm; It is not a heavy bearer, but it yields a moderate crop every year. For the past two years in succession we have taken two barrels of apples off a tree twelve years planted, so you see that is not doing badly. I believe in certain sections it is much troubled with scab, but in the Ottawa Valley we have very little scab, and we are not troubled with that disease. This is a small specimen of the Gano; they usually grow a third larger than this. This apple is a seedling of the Ben Davis, and I regret to say is no better in quality, but it is a very hardy tree, an early bearer, productive, and where apples of this quality find a market, I think it will prove quite profitable. Here is the Winter St. Lawrence, another hardy variety and which is doing very well in the Province of Quebec; it is a little later than the ordinary St. Lawrence. Here is the Kinnaird that is going to do very well in our part of the country. It has a flavor like the Northern

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Spy and although not quite so good in quality, is a very desirable dessert apple. The tree is growing in the most exposed part of the orchard, and has been there nine years. It seems perfectly hardy. It is one of the seedlings from the South-western States. Practically all the varieties we are recommending are of American origin, that is, the trees of autumn and winter apples. The best of the early apples are from Russia. I think we must look in future for the origin of our best apples to Canada and the United States, and I believe it is quite likely that we shall get our ideal apples from the South-western States, for this reason, that nearly all the apples which are originated in the northern parts of Canada are early varieties, and what we are after is a late keeping variety. Now if you can get a variety from the South-western States which combines hardiness and late keeping and good quality and other good points, you are going to get the ideal apple. The Ben Davis, although it is not of good quality, is perfectly hardy, and it seems to me that there are more chances of getting a late keeping variety from places where growth is longer in the season than it is to get them where the growth is very short.

Dr. SAUNDERS: What about the Swazie Pomme Grise?

Prof. MACOUN: It is not a late keeping apple. I have some specimens here. This is a hardy sort, and one of the most valuable apples for dessert purposes. It has a delicious flavor, and is well worth growing for home use. The tree is not very productive, and is not very thrifty on that account, will not prove perhaps valuable from a commercial standpoint. At the Experimental Farm we have been trying to originate some new varieties of apples, and as Dr. Saunders brought before you last year, his special work has been in originating apples which would be hardy in the North-west Territories. I think from the results which were brought before you last year you will realize that he has done very much work in that respect. Now we are trying to originate varieties which will be useful in Ontario and the Province of Quebec, and I have now some two-year-old seedlings which we are going to put out in the orchard in the spring, and I hope to get a good many hundred of them—seedlings grown from the best apples fruited at Ottawa—and I am hoping that from these we shall get a few varieties which will be better than any of those that we have. Prof. Hutt has stated that the best apples we have are from chance seedlings, but we must remember that those chance seedlings have originated over a very long period, probably two or three centuries, and I think the chances are much greater that we shall get some good sorts by a systematic growing of seedlings We are also doing a little in cross breeding by combining the late-keeping qualities of some varieties with the dessert qualities of others, and I have chosen as the male and female parents the McIntosh Red and the Delaware Winter or Lawver. This Lawver is an apple which you can keep in an ordinary cellar for eighteen months. It just gradually withers up, and they can be eaten at the end of eighteen months, although of course there is not a great deal of juice in them at that time.

Mr. RACE: They keep better if kept from the air as you would in barreling apples.

Prof. MACOUN: Yes, they would keep in much better condition. The Lawver is moderately productive, of a high color, and the quality, although not highly flavored, is juicy, sprightly and pleasant. We think that by combining this very high flavored variety, the McIntosh Red, with this other kind, that we may originate some new sort which will be more valuable than any of those that we have. I stated that the chief cause of death at the Experimental Farm was from root killing. We have tried to prevent this by experimenting with cover crops and, I think, have demonstrated quite thoroughly, that the trees can be protected very much by the use of these cover crops. We have found that the best cover crop for the Ottawa District is the common red clover. By sowing this about the middle of July a very good stand can be obtained of from ten to twelve inches in height, and this will protect the roots of the trees in winter and hold the snow, and there is not nearly as much danger from winter killing.

Mr. McKINNON: Does it encourage field mice?

Prof. MACOUN: We have not found that it has so far. Of course, the young trees should always be protected from field mice anyway, and it will not matter if the clover is there or not. No one should allow his young tree to go through the winter without protecting them in some way from field mice. I think young trees can be protected from sun scald by means of a tree protector which is now in use in the Western States, made of a very thin slab of wood which you can wrap around the tree and twist the wire

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together, and this stands about two and a half feet wide and protects the trunk of a tree from the rays of the sun in the spring, and there is a good circulation of air between the protector and the tree. We have found that the sun-scald has not been nearly so bad when we used those protectors, and they will prevent the mice from getting at the trees.

Prof. HUTT: Put them on in the fall and keep them on in the spring?

Prof. MACOUN: Yes, but it is not necessary. If you want to save your protectors it is better to take them off rather than get the weather all summer. In connection with these cover crops I may say we have tried several different methods of tillage in our orchard at the farm. As you know, the usual method recommended is to have a cover crop that you plow under in the spring, and then cultivate the orchard until July. I found that at Ottawa the soil, which is rather light, was very liable to be carried away with the wind, and it required something to protect the surface of the soil throughout the season, so that I found it was better to leave the cover crop all summer, as we do not suffer from drouth there, there being apparently plenty of moisture in the soil; so that instead of plowing the clover under in the spring we start cutting it with a field mower, and we have had as many as five good cuts from this clover during the season. By cutting it just when the bloom is showing you can save the strong plants, and your second, third and fourth crops will be almost as good as the first. In calculating the amount of green clover which was left lying on the ground I figured out there was about twenty-five tons left to rot on the surface of the soil. This is plowed under after two seasons, and the ground is re-sown with clover.

I mentioned to you that there are very few varieties of the better class of apples which were proving hardy at Ottawa. In order to see if we could not get varieties to succeed there that do well in Western Ontario, and other more favored parts of the Province, we are trying experiments in top-grafting, and have used as stocks such hardy varieties as Haas, Gideon, McMahon White and Hibernal. Those varieties are not subject to root killing or sun scald. The results so far seem to justify the conclusion that we shall be able to grow such varieties as Ontario, Northern Spy and Baldwin at Ottawa—whether for commercial purposes or not I cannot say, but at least for home use, as we have Northern Spy which has been fruiting for several years now, grafted on Wealthy, and although the union is not good the tree is perfectly hardy. We are also trying experiments with different kinds of stocks. You may remember that in his address last year Dr. Saunders spoke of his hybrids being originated from crossing the Pyrus baccata, the Siberian Crab, with some larger apples. This Pyrus baccata is very hardy, and we are using it for grafting other root varieties on, and we are hoping to get better varieties in this way. Dr. Saunders reminds me that our experience has been that Northern Spy grown in the ordinary way will not succeed there; the tree sun-scalds and root kills, and is quite a failure, but we have had several crops of good Northern Spy apples from being top-grafted. The conclusions, then, that we have reached in regard to apple growing in such a cold climate as that of Ottawa, are: that you must use warm, well-drained soil, use cover crops, and grow only the very hardiest trees, and root graft them preferably on hardy roots. In regard to pears, we have tested a large number of varieties at Ottawa, but very few kinds have reached the fruiting age. The varieties which have fruited are the Bessemianka, Sapieganka and Baba of the Russian varieties, and Longworth and Flemish Beauty of the American varieties. None of these varieties except the Flemish Beauty is worth growing anywhere where pears can be bought, because the Russian pears, although they appear quite hardy, do not keep any time; in fact, they begin to rot before they are ripe, which is a remarkable thing about them, and they are gone before you are able to use many of them. They are also very subject to blight, and on that account are not desirable to grow. While the Flemish Beauty is not perfectly hardy at Ottawa, we have one tree which has been planted since 1890 and which has borne several crops of fruit, and we are hoping that by grafting from this tree we may be able to get a hardier strain from that variety. So that our success in growing pears has not been great. We are in the position, however, to recommend people not to plant pears in that part of the country. We have tried nearly all the European kinds of plums that are advertised in this country, but find that very few of them can be grown successfully. Some seasons you would get a few plums, but in the majority of cases the flower buds are killed by frost, though the wood is perfectly hardy. The hardiest European plums we have found there are Glass' Seedling, Early Red, Richmond and Barnett's Yellow. The last three

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were brought from Europe, and are varieties which Prof. Budd was the means of disseminating. The Japanese plums are about the same as the Europeans at Ottawa. In protected places they have borne well in the vicinity of Ottawa, but when exposed the flower buds are killed by frost in the same way as the Europeans. The chief hope at Ottawa is with the American plums, and although perhaps they are not worthy of being spoken of when compared with the European plums, yet where we cannot get European they are very good indeed, and the fruit growers around Ottawa are planting them more extensively this year, some kinds now being developed by nurserymen being very good indeed. I might mention the following as those which we recommend, ripening in the order named :—Atkin, Cheney, Bixby, Gaylord, New Ulm, Wolf, City, Silas Wilson, Stoddard, Hawkeye, Wyant, American Eagle and Hammer. This is a selection taken from over 100 varieties, and I think comprises the best of those on the market, unless it be some kinds we have not been able to get. In cherries we have not had very good success either. The principal reason, however, is that the original orchard was comprised of trees which were grafted on the Mahaleb and Mazzard stock, and during the winter of 1895 and 1896 then there was very little snow on the ground nearly all the orchard was root-killed. Since that we have been grafting on wild cherry bird stock, and the results have been very gratifying indeed. These trees appear perfectly hardy, the fruit is perfectly good, and I think it would be well for any nurseryman to use this stock who proposes to ship to Europe or Quebec. We have trees bought in 1890 where the union is still perfectly good. The hardiest cherries we have found so far are :—Amarelle Hative, June Amarelle, Shadow Amarelle Heart-shaped Weichsel, Griotte du Nord, Orel, Cerise d'Ostheim, Brusseln Braun and Koslov Morello. This covers a season of about five weeks.

Mr. CASTON : There are several under the name of Orel?

Prof. MACOUN : Yes. That is really Orel No. 25 that I speak of. We have been testing also a number of varieties of grapes at Ottawa ; we have now 175 kinds there. The grapes have proved perfectly hardy as far as both roots and wood are concerned ; we have no trouble from root killing. The system we adopt there is to cover the canes every autumn with earth, and then the snow comes and protects; but we cannot grow grapes there for commercial purposes unless it be the hardy varieties of wine grapes, which can be grown without going to the trouble of covering them with soil, which is very expensive and on that account is not practicable for use on a large scale. Of the varieties which are almost certain to ripen every year, and which are of fairly good quality, I might mention Moore's Early, Moyer, Peabody, Canada, Brant and Newmarket, and I think Campbell's Early may also be classed in this list. Then next are Wilder, Roger's No. 17 and Delaware. Then another class is Moore's Diamond and Brighton. Then in a class which do not always ripen early are Lindley, Agawam and Vergennes. These varieties do ripen some seasons at Ottawa, and we can get very fine samples of them indeed, but as a rule they do not ripen perfectly. That has been our experience with the large fruits, and I might also probably later on in the meeting give our experience with small fruits. I will be very glad to answer any questions.

Mr. MORRIS : How tall are the stems of your apple tree?

Prof. MACOUN : From two to four feet. We try to train our trees freely.

Mr. MORRIS : They are perfectly shaded at the top. I don't see how the sun scald occurs.

Prof. MACOUN : Our prevailing winds are from the south-west, and it is on the south-west side of the tree the sun scald occurs, and the trees all get a little sweep to the north-east.

The PRESIDENT : Do you plant your trees upright?

Prof. MACOUN : Yes.

Mr. MORRIS : We have the same trouble in the south here exactly in regard to that as they have. If a tree gets leaning to the north-east, that tree is going to die. It is very important to plant them leaning to the south-west, and see that they do not get over to the east, even if you have to stake them. The sun striking the stem when it is leaning that way is generally what kills them. Keep the tree leaning to the sun and it will not hurt them. Another thing is that many trees are ruined in planting out by cutting the tops off the first year. That exposes all the stems to the sun and the weather that year, and they are very much damaged even if they live through it.

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A. H. Pettit: Do you think the sun scald is caused in the summer time?

Mr. Morris: Yes.

Mr. Pettit: I believe it is caused from the sap in the winter.

Mr. Boulter: Do I understand you that it is objectionable to cut the tops of the trees off when you are planting them out the first year?

Mr. Morris: Yes.

Mr. Boulter: You are selling trees, and we are buying them. Now, I put out 1,000 trees in 1878 and I cut the tops all off and I never lost one. I always thought if you had a trunk you could grow a top.

Mr. Morris: We are apt to cut off the tops to balance the root. Our forefathers always did it, our neighbors have done it, and everybody else has done it, and we think it the only proper way. But did you ever reason it out? The root can not grow unless there is a growth in the top, and the top cannot grow unless there is a root-growth. They both want to go together. When you cut off the top of a tree and leave a few stems near the stock, it requires a great effort of nature to push those buds. Those buds do not start readily like those on the upper part of the limb, and the consequence is, when the buds do not start the roots do not start, and the roots not starting those buds do not start. (Laughter). Leave the whole top on; that top answers other purposes besides growth. Those buds on the hundreds of these limbs, all grow a little; they will help the roots, and then the roots will help to put growth in the top as well.

Mr. Caston: There is not very much root there to start, that is the trouble.

Mr. Morris: It does not matter how much root there is. Anyway, you get altogether a very much greater growth in the root, the tree becomes a very much better shape that first year by leaving the top on than by cutting it off.

Mr. Boulter: Do you advise cutting it off the next year?

Mr. Morris: Yes, cut it off the second year just as you would the first year, and then it is ready to force those lateral buds and to become a good, strong, shapely tree next year. Now, there is another thing in connection with this. When you take the top all off you do not get a new top that year, you get a little growth, and that stem is exposed to the sun and it hurts that tree. Perhaps it will take years before it will recover the damage done that year. I am glad to say that I have induced one gentleman to adopt my plan last spring, and he reports to me so far that he can see it is a success, and I hope that he will come here and tell us at the end of two years how it has turned out.

A Delegate: Can you adopt that plan with the peach as well as with the apple?

Mr. Morris; Not with peach; I would say apple, pear and plum. I remember showing our president a few rows of trees in our nursery where the heads had been cut off, and a few rows along side of them where the heads had not been cut off, and the stems of those where the tops had been left on were double the size of those that the heads had been cut off. Do you remember that, Mr. Orr?

The President: Yes, I do.

Mr. Morris: That just carries out the truth of my theory.

Mr. Harold Jones: You would recommend to trim off some of the lower limbs to balance the top a little the first year?

Mr. Morris: I would not cut off any limbs the first year. If you cut that back three or four inches, leave the sap there and then cut that off the second year, and then the growth the second year will be strong enough to seal that over. When you cut it off the first year, that cut is exposed all the following winter and in apples often causes what is called the black heart.

The President: This is a very interesting subject indeed, and I am sorry that we cannot spend an hour at it. I have had considerable experience in planting trees, and I have no trouble with sun-scald, and I do not think the trees are killed by frost in the spring when the sap is in, I do not agree with Mr. Pettit in that. I have a thousand trees I planted, and in planting our trees we lean every tree to the west, so that a plumb line hanging from here (showing) would bring it out about 14 inches from the root. Just as soon as the foliage comes the trunk of the tree is sheltered. I have not a tree out of 8,000 or 9,000 that is sun-scalded where the top has protected the trunk, and scarcely a tree that is leaning over at all. About the fifth or the sixth year the tree, by the prevailing winds from the west, will be just about up straight, and then have suffi-

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cient root to maintain it there. I think it a most important thing, as Mr. Morris suggests, to lean every tree, heading it to the prevailing wind. When it grows and brings foliage I do not think you need have much fear of sun-scald.

Dr. SAUNDERS: I think this subject is one of very great importance, and it is well that we should understand it thoroughly. As I understand the discussion as far as it has gone, and Mr. Morris' views, he would not have you get a tree all mutilated in the roots, leaving the whole of that top on because that would be an unfair tax on the root system, but to leave plenty of terminal buds in order to fully balance all the roots that were left, and have those start promptly in the spring so that they would encourage a rich growth, and start at the same time, and the growth would go evenly and be well-balanced. It seems to me that it is a very philosophical way of looking at the matter, and to adopt the extreme method of cutting off all the top would be unwise, while to adopt the other extreme of leaving all the top on would be equally unwise, and by judicious cutting back, not too much, and leaving plenty of terminal buds, which, as Mr. Morris says, start the earliest in the spring, to encourage the root growth, I think the greatest success would be achieved.

A. H. PETTIT: Just one word, Mr. Chairman, in regard to your criticism of my remarks on sun-scald. Where do we find sun-scald? We are finding it chiefly in the northern and eastern portions of the Province. Now, the sun shines there just as hot as it does in the southern part. I claim it is the frost in the winter that ruptures the sap cells in the body of the tree, and the effects come out in the summer. I do not think the sun-scald is caused by the summer heat at all; it is caused by the winter.

Mr. L. B. RICE: I would like to ask Prof. Macoun if in trying different varieties for grafting he had tried the Tallman Sweet and the Liscombe. Several years ago one of our people made an exhaustive experiment extending through some fifteen years and different varieties, and his reports showed that the Tallman Sweet, which is a very strong root grower and the Liscombe were two of the strongest stock trees he could use for grafting tender varieties on. We have a great deal of experience with sun-scald, because we cannot set out a tree that is not scalded, and you will find the scald will show itself in trees planted in the fall or early in the spring. I set a good cedar post in the ground and set the tree on the northeast side of it and have no sun-scald. My theory is that in the coldest weather that we have, when it freezes so very hard, about three o'clock in the afternoon the sun shines out just enough to start the frost out on that southeast side and then it freezes again the next night and that kills the tree.

Mr. HUNTER: I must protest against the statement that it is in the winter that the trees are sun-scalded. I have a good deal of experience in both planting trees and assisting others, and I find that trees planted in the spring were sun-scalded during that summer quite frequently. I mentioned that at a meeting of this Association in Brantford some years ago, and stood alone on that question about leaving the top on the tree. I have set out seven acres this spring, and I have not a sun-scald in one of them, and I have the top on every one of them. That sun-scald is local. Up in the dry plain here we are subject to that kind of thing, and if we cannot get well rooted trees, and well protected from the sun during the summer, we cannot get them started at all. I have had experience in planting trees in Delaware, where we can get them started without any root at all. Even our maples do not stand the sun-scald in the summer here.

Mr. CASTON: I heartily agree with Mr. Pettit. I believe the injury occurs from this cause. It is about the time that the maple sap is running, and we have a very warm sun for two or three hours in the middle of the day, and on the southwest side of that tree, especially if we have a southern exposure, we have a special condition set up—heat in the middle of the day and winter temperature at night—and that repeated day after day is the cause of the black streak from the head of the tree down. You will find that where they are planted on a western or northwestern exposure they do not suffer so much, because generally there is a cool breeze from the west at that time, and where that occurs we do not have so much sun-scald, which is the cause of great loss to trees in this Province, and far worse in some localities than others.

Mr. MCKINNON: I have about two hundred pear trees planted in this way—the roots almost entirely cut off, the stems cut down to about eighteen inches, and it is the most beautiful lot of pears that I have, and I scarcely lost one, certainly not one in a hundred. It is a very easy way to plant and very satisfactory.

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Mr. E. D. SMITH: It strikes me that this thing has proved itself in regard to the time of the year the tree is injured. It is admitted that in the Niagara District we may not be troubled with it, but they are troubled with it here and at Ottawa. Well now, the sun is certainly as hot if not hotter in summer in our district than in any place in Ontario; therefore it is fair to assume that it is caused in the winter. Every nurseryman in Canada and the States sends out instructions to his customers all over the country to cut their tops back when they plant the tree, and urge as a reason for that that when such a large portion of the roots is cut off an equal proportion of the top must be cut off to balance the tree; when the first buds that are started in the tree are started from the sap that is contained in the tree, and if a large number of buds were left on the top the sap is exhausted from the tree and it becomes unable before new roots are formed to furnish further sap. That, it seems to me, is the theory whether it is right or wrong. If it is wrong it is an exceedingly important matter that the whole country who are buying trees should be rightly instructed about this matter.

The PRESIDENT: I believe in the northern section where you get 20 to 30 degrees of frost your trees may be injured in the winter. It is usually on the west and north-west side of the tree that the damage is done. I believe in our section if a tree is properly planted and the trunk is covered by the top that we will have no sun scald. That has been my experience.

CANADIAN FRUITS AT THE PARIS EXPOSITION AND IN THE BRITISH MARKETS.

BY DR. WM. SAUNDERS, DIRECTOR DOMINION EXPERIMENTAL FARMS, OTTAWA.

It affords me great pleasure to come before you to-day to give you some little account of the way our Canadian fruits have been received across the water at the great Paris Exposition and also to explain about the character of that exhibit. I may say that, standing by the exhibit as I did from day to day for a considerable period, scarcely half an hour would pass at any time but some one or group of individuals would pass by and look at these fruits all marked from Canada. It was the greatest surprise to those people that such fruits would grow in such a cold country; they could not understand it, and they would ask for explanations and when they were satisfied they were bona fide Canadian fruits then they thought there was something in the glass that magnified them, or something in the fluids, and this they also had to be satisfied about by extensive explanation, and then they would pass on—"Ah, wonderful!"—they could not understand it. And this sort of thing was going on all day long with foreigners from all parts of the world, and I do not think Canadian fruits and Canadian climate and its character received so great an advertisement as has been given to the Canadian fruits this summer in Paris. Now let me explain to you, in a few words, the way in which this exhibition was got up and of what the exhibition consisted. At the outset it was decided by the Minister of Agriculture that this exhibit should be of such a character as to have representation of all our choice Canadian fruits from every important fruit growing centre in the Dominion, from the Atlantic to the Pacific, so that the visiting world there would be impressed, first of all, with the idea of the fine quality and character of our Canadian fruits, and secondly with the vast area over which those fruits could be grown, thus demonstrating to the world that Canada has practically inexhaustible resources in her growing and producing capacities.

To accomplish this we endeavored to enlist the services of prominent fruit growers and men who were interested in fruit in all parts of the Dominion. Beginning with the west, we got the local Government interested there. They employed the Deputy Minister of Agriculture to go through different parts of British Columbia, through the drier sections of the country in the interior and through the different parts of the coast climate. The superintendent of the Experimental Farm there was instructed to devote all the time necessary to gathering fruits in his part of the coast climate, and also to send a very good representative collection, which he did, from the Experimental Farm at British Columbia, where we have the largest number of varieties of fruits gathered together that is to be found anywhere, I think, in the world. With these two sources to draw from,

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and the assistance of a few isolated fruit growers, such as Lord Aberdeen, at Coldstream, who sent an excellent collection, and Mr. Thomas Earl, in the upper district at Lytton, we got together an extraordinary collection of fruits from British Columbia, that astonished everyone who examined them. In Manitoba and the Northwest the superintendents of Experimental Farms collected together all the collections of small fruits that were obtained, raspberries, strawberries, gooseberries, etc., and preserved these. It was decided to divide the exhibit into two parts. In one part we would have all the perishable fruits—beginning with the strawberries and extending to the early ripening pears and apples—we would have all those preserved in bottles in antiseptic fluids. While this would not preserve them in a fit condition to be tested as to quality—while they could not be eaten—yet it would give the visitor a good idea of their size, and form, and beauty, and general aspect. The Experimental Farm did the bottling work for British Columbia; and for the centre fruit was collected by the parties as I have explained. In Ontario a noble work was rendered by the Ontario Government, through Prof. Hutt, in collecting and putting into suitable jars a very large collection of Ontario products. I think there were about six or seven hundred bottles put up at Guelph in this way, and thus all the early perishable fruits were represented from the western part of Ontario. Mr. A. McD. Allan undertook the collection of fresh fruits and through him a number of people became interested in the matter. Our Secretary here deserves special mention for the attention he gave to the matter. Mr. A. H. Pettit also, and I think Mr. Murray Pettit, and a number of other people in the Niagara district, interested themselves in the matter, and we had a very excellent display from this section of the country. In the East Mr. Harold Jones furnished us with some very fine specimens. Mr. Whyte also furnished us with quite a number of small fruits of his own growing at Ottawa, and Mr. Macoun took a great deal of interest in the matter, and put up a very large collection of the fruits grown at the Experimental Farm, so that both the Eastern and Western parts of Ontario were well represented in this grand display which was brought together. In Nova Scotia Mr. Bigelow, the President of the Fruit Growers' Association, took the matter in hand and with the help of another gentleman, Mr. Chas. A. Patriquin, a large collection was made of the softer fruits and a very good display of the late keeping apples brought together. Mr. Thos. Peters, Deputy Minister of Agriculture for New Brunswick, worked among the New Brunswick people and got a good collection of fruit, and Mr. Jeremiah Clark from Prince Edward Island, whom I see here to-day, did good work in bringing together all the varieties they could show. With the help of this machinery there were brought together about 1,500 jars of preserved fruit kept in antiseptic fluid, which, up to the present time, shows very naturally in most instances, their natural color and appearance and size, and were of great value to us in completing our exhibit by representing the sections of our fruits which could not have been shown in any other way. Besides that we had nearly 600 bushel boxes of fruit which were put in the cold storage in Montreal late in the autumn and early in winter, to carry on these exhibits of fresh fruit, which have been a surprise to all the visitors at the Paris Exposition and have done such credit to the country. These fruits were put in the Union Cold Storage Co.'s warehouse, and were kept at a temperature of as near 32°F. as we could keep them during the winter.

It was contemplated to send these over to France in March or early in April so as to get them to Liverpool before the hot weather would come, because we knew that there were no means of transporting them from Liverpool to Paris in cold storage—they would have to perform that end of the journey in the ordinary way. But there were delays in connection with the Exhibition Buildings; they were not nearly completed by the time they were promised, and there were delays also in our Canadian Building, in completing the cold storage facilities, and it was the middle of May before we could send those fresh fruits from Montreal to Liverpool, and it was about the middle of June before we could get them from Liverpool over to Paris. They were, however, kept in cold storage all the time except during the journey from Liverpool to Paris. It was in the middle of June, when the weather was hot, and they were nine days after they started from Liverpool, though sent by the quickest route that could be had, regardless of what they would cost in reaching Paris. It seemed a matter of surprise to me that, after going through such a perilous journey, they came out as well as they did, but it did affect some of the softer apples, such as the McIntosh Red and the Fameuse and

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two or three other varieties of that class. They did not show as well as they would have done if they had had a fair chance, but all the later keeping varieties of winter apples were practically perfect when they arrived in Paris. They were then put into our own cold storage under the Canadian Building, which was fitted up with shelves all around so that the fruit could be unpacked and every imperfect specimen discarded, and we thus had perfect specimens kept there at about a freezing temperature, and they remained there with various accessions to the quantity, and, drawing from them continually, we were repeating our exhibit of these late-keeping fruits until the close of the Exhibition in November. We did not ship all the fruits at once. 150 boxes were sent from Liverpool the first shipment. The next shipment of 100 boxes was made some time during August, and they got over in six days, and the third shipment got over in five days, and the fourth shipment was made after I had left to come home and I have not heard yet how many days that took to get over, but I suppose it would not exceed that length of time, so that we improved in the way of rapidity of transit after we got into the way of handling the thing better, and these later shipments of fruit reached Paris under still more favorable conditions than the earlier ones. The bottled fruit had rather rough usage. It got to Paris before the buildings were completed; it was sent over in good time but, amidst the mass of material that was accumulated, they were shoved around from one point to another, and though the boxes were all marked strictly "this side up," yet our manager tells me that they were almost always found that side down whenever they were found (laughter). There was no regard whatever to the way in which these packages were left when they were left to themselves, and as these stoppered bottles, when they are jolted about, are liable to start the stoppers, we found when we came to open the packages that a great many bottles had leaked out more than one half of the fluid, and then, when the cases were turned over, of course it would jam up the fruit in a soft condition and destroy it. The stoppers were tied down with a piece of cotton, but in some cases the cotton had not been wet before tying, which should have been done, and the little play that was allowed was enough to start the stoppers the least bit, and then when it was once started that little bit the fluid would gradually ooze and drop out, and, when left for a week or two with the cases turned over the wrong side up, you can understand that the stoppers, which were imperfectly ground, would be almost sure to leak more or less. However, when I reached Paris on the 6th of June, I found there were about in all 1,200 bottles of fruit, preserved in fluids, out of the original 1,500 which had been put up, that were in very good condition. We had between 900 or 1,000 of those in the Horticultural Pavilion where the great display of fruit was made, and then we had about 250 bottles in the Canadian building, where they were used to lighten up and decorate the other parts of the exhibit, more particularly the grain exhibit, and also being put there for the purpose of showing those visitors who might happen to go there and not see the Canadian fruit elsewhere, to give them some idea of the fine quality and character of the fruit we were growing here. The cold storage facilities provided at Paris were very good. But for this we could not have made the showing we did, nor secure the number of awards. It would have been impossible to have carried on the exhibit for any length of time. It was a little late in being completed, but when finished it served its purpose admirably. Now, many people have been surprised at the number of awards that were made to the fruit. In proportion to the exhibits, the awards to the fruits were much larger than they were with regard to any other class of exhibits that were made, and I want to give you the reason for that. Where all those perishable exhibits such as fruits and flowers and vegetables were concerned the judges were required to meet every three weeks. Sometimes the limit of time was not much more than two weeks, but the average was three weeks during the entire exhibition so as to judge all the fresh material that was brought together. The larger part of the Horticultural display, that is the flowers and vegetables, were only shown for four or five days every three weeks. After that interval everything was carted away; the ground, where the flowers had been, was dug up and fertilized, got ready for the next display, so that, when the people were ready to bring together their next display of flowers and vegetables, the place was all clean and orderly and ready to receive them again. Now, this concourse of the judges, as it was called, which occurred every three weeks, gave us good opportunities to get a renewal of our premiums. We had an abundant supply of fruit in the cellars of the cold storage warehouse all arranged on shelves. Every day

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our collection was gone over by those in attendance, and if there was an imperfect specimen it was removed and a perfect one brought up and put in its place; but when the judges were about to appear on the scene again the whole collection was put away and an entirely new one brought out of the cold storage chambers, so that the judges did not have to judge the same material; they judged on an entirely new collection, and our 500 boxes of apples gave us room to make a fine display every two or three weeks during the entire exhibit, and never show to the judges any fruit the second time. In that way we got awards first of all for the Dominion and the different Provinces; we got awards for the Honourable Ministers of the different Provinces; we got awards for the Fruit Growers' Association of Ontario and Quebec, for Nova Scotia and Prince Edward Island and British Columbia, and we got towards the last a few awards for some individuals, including gold medals for our worthy Secretary who had done a large amount of work in connection with the exhibition. Besides getting these awards we have two or three times got the Grand Prix, which is an award higher than anything represented by medals, whether they be bronze or gold or silver. On the 4th October I was in Paris awaiting the arrival of the first consignment of fresh fruit which was sent over from here some time in September. I believe it was about three weeks from the time it left Canada until it reached Paris, and I have all the details here in connection with every box of fruit that was opened as to how everything came out, and in the majority of cases the fruit came out in a most satisfactory condition. The peaches were the only exception—the only instances where there were any considerable number of the fruits decayed—and, as those were the most difficult subjects to carry, I give you the particulars of the two or three packages of peaches that were opened in my presence. There was one case of Elberta peaches, which were wrapped first of all in waxed paper, then with soft manilla. Thirty-five of that hundred were perfectly sound and were displayed, and astonished the visitors at their size and magnificence; twenty were more or less spotted with decay, forty-five were wholly or partially decayed.

Mr. McKinnon: Those had been five days without cold storage.

Dr. Saunders: At least that. They had been sent to Liverpool, and then transhipped from Liverpool to Paris. There were 25 Lord Palmerston peaches sent in a case with some other material; they were wrapped in double brown manilla paper; 18 peaches out of 25 were in perfect condition, 7 were more or less spotted, and those that were in good condition were tasted by the judges and the fruit found to be in fine condition and very high in flavor. The other one contained 100 specimens of late Crawford. Of these 31 were perfect, 14 were a little bruised, 55 were partly or wholly decayed. I think, considering the soft texture and easily injured character of this particular class of fruit, it is astonishing that we got so many specimens in perfect condition, considering the long journey they had to make, and the long time occupied in making it, and that part of the journey was made without cold storage.

Mr. McKinnon: Do you know how long it was, after they were packed until these were unpacked in Paris?

Dr. Saunders: I could not say. I have no particulars of the time they were packed. I think I could find you the exact number of days from the shipment in Montreal, but the Secretary could tell perhaps whether those were delayed at all after they were packed.

The Secretary: They were a few days in ice storage at Grimsby and two days from Grimsby to Montreal on refrigerator car.

Dr. Saunders: I will give you a duplicate list of some of the varieties of fruit which are not supposed to keep very well. Take for instance the Chenango Strawberry apple. There were 25 specimens sent in one case, packed in soft manilla paper and the spaces filled with excelsior. The specimens were sound but most of them were slightly bruised and this variety seemed to show these very slight bruises in rather a characteristic way, which led those of us who were there to pronounce this apple as not a profitable one for shipping to Europe. The Alexander apple of medium to large size, well colored, came out all quite sound where the packing was well done. There was a case, No. 31, of Mr. Woolverton's, every sample of which was sound. There was another case sent from Quebec which was put in a box without any packing at all and not very tightly packed, nearly all of which were bruised as you might expect; but, whenever care was

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taken, even apples of that texture came through in the most wonderfully good condition. Flemish Beauty pears came through in excellent condition. Duchess apples from New Brunswick came through perfect. Apples from Montreal such as Fameuse, Gravensteins and Red Gravensteins from Nova Scotia and from Ontario, and a number of other varieties of that same character came through in perfect condition. There was a case of Souvenir de Congres pears that came from Grimsby. The case was lined with excelsior, with moss for packing, the fruit was wrapped in waxed paper, the outside wrapper being plain tissue paper. The specimens were large to very large, and they were all in perfect condition. That variety of pear, I should judge, is not easy to ship.

The same testimony was had with regard to the Bartletts and other pears having that character, and I think the fruit growers and all those interested in that subject may be very much encouraged by the state in which that first shipment of fruit reached Paris. All the varieties of apples, which we know as our good apples, came through, without exception, without a bruise, and they were carefully packed. Excelsior was used in packing them, which you know is an elastic material and which I think should be used much more in packing fruit in the future than it has been in the past. When going through the markets in London and examining the condition of our barreled fruits as they were opened from Ontario and Nova Scotia, it was lamentable to see the number of bruised specimens which presented themselves whenever a barrel was opened. The ordinary practice of filling a barrel up and then pressing it down by means of a lever by sheer force, is a practice which must necessarily be associated with the large number of bruised specimens. I had a good opportunity of seeing, in the American exhibit, the results of using excelsior. Ellwanger & Barry sent a selection of pears in half barrels. There was a wad of excelsior at the bottom and one at the top, and out of eight or nine specimens of pears, four or five of each, there was scarcely a bruise on any one of them, with the exception of a few that were over ripe. I believe it would pay shippers to Europe to test that thoroughly, by puting three or four inches of excelsior in the bottom of their barrels and instead of pressing them down with a lever or a hay-press—that hard wood coming in contact with the apples—to have a good thick layer of excelsior between the fruit and the cover, which would be elastic enough, I think, to keep the fruit perfectly tight until it was unpacked. The English buyer would very much rather have one or two layers of apples left out of a barrel and have them all sound than have 25 per cent. added to the weight of the fruit and have it come out in a bruised and unsightly condition. Now the second shipment of fruit reached Paris about the end of October. By that time I had returned to this country and Mr. Allan was in charge. He says, "I enclose list of results of last shipment of fruit, which was evidently satisfactory and we have been able to carry everything before us. I feel particularly proud of the Grand Prix which we have taken for Export Fruit." At this last exhibit at the close of the fair, Mr. Allan arranged the fruit in a different way from what it had arranged before, by packing it in all the different forms of packages which are used in Canada, commercial packages, both of the old fruit and the new fruit and putting it up in baskets of various sizes, some of them fancy baskets and some of them plain, so as to show an excellent commercial exhibit, and for this commercial exhibit, right at the close, we took another Grand Prix, which was very gratifying. He says, "I feel particularly proud of the Grand Prix for Export Fruit, which included the cold storage apples from 1899 and apples packed in all the kinds of boxes we use, also barrels, the whole forming a display that would even astonish any of us, the effect was so fine. I had also baskets of every size neatly packed with kinds to suit the various sizes. I am still after the Jury to try to get other prizes for our Fruit Growers' Associations and large growers. I have made very large sales and am afraid to make more, as I have to deliver from the various British ports, and it will take time and will require my personal attention. I have succeeded also in making some important contracts which is very gratifying to me. I can see such connections can be followed up with great results to Canada, even in the far distant lands. I have made two important sales of apples in Alexandria, Egypt, which I have to pack and despatch from London." He also speaks of other business transactions, which he has made in connection with the fruits of this country, showing that there are large avenues still open for all the fruits we can grow. From what I have been able to see, I firmly believe that with first class packing first of all, and selection, and suitable arrangements made on the other side, there

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would be an outlet for ten times as much fruit as Canada is able to produce at present, and that the fruit would then reach some considerable portion of the people, whereas there is scarcely one in ten, of all the people I have met with, who have ever heard of or seen Canadian apples. We send, I suppose, 500,000 barrels of apples to Liverpool, but the seem to disappear. I was dining with a friend, a prominent scientific man of Liverpool, and he said to me, "Can you tell me where I can buy Canadian apples? I have inquired, and I never can find any in the market; I would like to get some, but do not know where to look for them." This is in the very city where we send the bulk of our apples. I suppose they disappear and go into the surrounding district. I didn't have time to inquire into that, but in London I inquired from different dealers what they thought of Ontario apples. "Oh," they said, "we don't often get any Canadian apples, all the apples we get are from Nova Scotia." (Laughter.) All the apples I saw in the market were from Nova Scotia and they did not recognize that as part of Canada. The Nova Scotians have captured that market, and from what I have been able to learn they make much better prices the season through for their apples shipped to London than the Ontario shippers do with their apples shipped to Liverpool. The opening of the Manchester market by the canal seems to have given quite an impetus to Canadian fruit. You would think that Manchester, only 30 miles from Liverpool, would get a large part of our apples, but they never seem to. If one of our shipments go to one of the large cities it never seems to find its way more than a few miles out of that city. I do not think any fruits that go to Liverpool find their way to London, or Bristol, or Glasgow, or any of those large places where fruit is consumed. And it seems to me that the fruit exports of Canada ought to be divided so as not to have them in such vast quantities in the one place, and I believe in that way better prices would be realized, because when there is a very large glut in any one market there are parties always ready to take advantage of that glut and try to run the prices down, so that they become unremunerative to our growers here. There was one thing that struck me in the Covent Garden market, of the lack of what we would call intelligent handling of fruit. I will give you an example. In looking over the stock there for sale I found a number of baskets of Vicar of Wakefield pears. To eat a Vicar of Wakefield pear in the summer time is quite an undertaking. I don't suppose any of you would attempt it—(laughter)—but everything that goes in that market has to be sold the same day. It is sold to a dealer, who sells it the next day to a customer, and the consumer buys it to cook or eat, and he cooks or eats it the next day; he has no chance to store it away waiting for it to ripen, that has never occurred to him, and all the intelligence that is required to get fruit into the market at the proper time must be exercised at this end of the undertaking, no trust being put in the intelligence of people, in that respect, at the other end. I have no doubt that the man, who bought those Vicar of Wakefield pears, would conclude that the pears that came from that country, whether Canada or anywhere else, were not worth eating, because he would have quite a task I am sure to masticate that pear, if he tried. I was also impressed with what I heard about the Keiffer pears, which I mentioned a while ago, and I believe it is injudicious for us to undertake to send to the British market, or any foreign market where we want our trade to enlarge, fruit of inferior quality, even if you can sell it for a time at a fair price. This impresses so many people with the idea that that is the best Canada can produce, and we don't want that impression to go abroad, and then in a little while it is attended with bad effect on the general trade of the country. This dealer told me candidly "They are nice looking pears, but they don't seem to command the same attention, or bring any way near the same figure, that they did some time ago." I told him I thought the reason was very obvious—that people were tired of eating that kind of stuff, they were poor in quality and a person buying them once would not care to buy them again. These Vicar of Wakefield pears were sold from 3 shillings to 3s. 6d. a basket, whereas the French Duchess and King apple sold for 8 and 9 shillings at the same time. Fine Gravensteins from Nova Scotia, of which there is hardly a higher flavored apple to be had in the world, were selling from 12 to 16 shillings a barrel. At the same time selected Fameuse sent over from Montreal by Mr. Sheppard, for the Army and Navy stores, were being sold at a guinea a bushel, every apple perfect, every apple of the same size, every apple without blemish and packed in bushel boxes. The day before I was in the Covent Garden Market one of the dealers told me, "Yesterday Ribstons sold here, selected apples, just such as Mr. Sheppard puts up

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for the English market of his Fameuse, selected Ribstons and selected Cox, Orange Pippins sold at 30 shillings a bushel in the Covent Garden Market." There are plenty of people who are ready to give any reasonable price for nice fruit, but if they open a barrel of apples and find perhaps 15 or 20 good looking specimens and five or six twisted, knotty and a few spots on them they won't give within four or five shillings a barrel for such apples, or 10 shillings a barrel in some cases, as they will where the specimens are all selected. Then another thing that is important in connection with the market in London is to have the fruits all the same size. If you open a barrel of Spys or Kings and find some specimens one-third larger than the others, the smaller ones may be called big enough to be called first-class specimens, yet the impression given to the purchaser is that the large ones are the best of the fully developed specimens and all the smaller ones are culls and imperfect. If there are different sizes to be sent, by all means send them separately. The larger ones will always get full price, more than the medium sizes as a rule, but the medium sizes, if they are not mixed with the larger ones, will command two or three shillings a barrel more when they are opened, if they are nicely sized, than they will if you put them in all different sizes. It is only necessary for us to understand these things to have our fruit growers take hold of that, but I hope that some of those who are packing for Europe will try that method of packing with excelsior, which I believe is about 1½ cents a pound. It gives no flavor to the apple; it is made of hard wood generally.

The PRESIDENT: It can be got for $17 a ton in Toronto.

Mr. CASTON: Could there not be a cheaper packing?

The PRESIDENT: There is nothing cheaper than that.

Dr. SAUNDERS: It is elastic and springy and there is a give and take to it, and if we can have our fruit opened up there, nice, even-sized selected specimens, sound and free from blemish, you will be surprised at the prices such fruit will bring, provided they don't get into the hands of a commission man who has got some end to serve and who will attempt simply to sell some other person's fruit that is not so good.

Mr. RICE: Do you place the fruit directly on the excelsior?

Dr. SAUNDERS: Yes, that is the way Ellwanger & Barry packed those pears. The idea of using the excelsior is to relieve the apples from the hard pressure that is given them from the hard cover of the barrel when they are screwed down, to retain them.

Mr. RICE: Would not the excelsior tend to affect the flavor of the apple unless it was wrapped with something to keep it away?

Dr. SAUNDERS: We could not find any evidence in any instance of the fresh fruit that was exhibited at Paris, of any flavor having been given to it where excelsior was used, which was I suppose in two-thirds of the packages that we got over in such perfect condition. That is why all of us who were there were so much impressed, in seeing our own fruit and seeing how the United States fruit came out where this material was used as a packing, with the importance of trying this on a still larger scale so that we might get the full benefit of it

Mr. McKINNON: How do Canadian pears compare in size, flavor and juiciness with French pears?

Dr. SAUNDERS: The Canadian pears are equal in my opinion, as far as I could judge, to the French pears, but they are not superior. I do not think they are superior in point of flavor. The market was full in France of such pears as Duchess and Buerre de Clairgeau and Louise Bonne de Jersey; these are the three varieties that are mostly grown in France. There were also samples of Buerre de Hardy, which were fine, and some other sorts we had a chance of testing, and while our Canadian fruit was fully equal to anything we saw there, I could not say it was any better.

Mr. CARPENTER: Are the Duchess grown in France of the same quality and flavor as Duchess grown here?

Dr. SAUNDERS: As far as I could judge.

Mr. McKINNON: I had a letter from my son in Paris saying that the French fruit exhibited at the Paris Exhibition was not to be compared with our Grimsby fruit for a moment, in either size or flavor.

Dr. SAUNDERS: Well, I believe in people being loyal to their country, and saying all they can for it, but I cannot go any further than I have gone (laughter), and Mr.

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Hamilton is an exceedingly good judge, who was there with me, and Mr. Allan, we all concluded that our fruit had nothing to lose by comparing it with French fruit; but you know the French pears are very high in quality, and you could not persuade a Frenchman that we had anything that was equal to the French pears, but I don't think they were quite as open to conviction as we were, and we had opportunities of seeing some very fine exhibits. What probably gave your son such an idea as that was this, that the French fruit was not in evidence all the time, as our Canadian fruit was. Their fruit was shown with flowers three or four or five days every three weeks, between the periods of judging, and then they were removed and nothing seen of them until the next exhibit. Our fruits were there all the time, and handled every day by the great mass of people that went there; and we had a much greater opportunity of making favorable impressions than the French people had themselves. They had, however, one exhibit, the 26th of September, which was quite a surprise to me. Up to that time I had reached the conclusion that the size and quality of the French fruit had been somewhat exaggerated, but they got together the most magnificent collection of pears I ever saw in my life anywhere. There were about two hundred varieties and they were very large and very choice, and there were quite a number of them that were new to me, and some of them, I should think, should make very fine shipping pears to Europe, and I made arrangements to get scions, or new trees, of most of those sorts while I was there, so as to have some of them tested at our Experimental farms. Some single exhibitors showed as much as 200 varieties of pears, and they didn't go in for any, or very few of the smaller sorts. they were nearly all large sorts. I have a list here, covering three pages of my notes of the varieties that I saw, and later on, when we have had these tested at Agassiz—which is the only place where we can grow these pears successfully—to make them available so that they may be tried in other parts of Canada—I hope to report on these.

Mr. McKinnon: Will your report be published?

Dr. Saunders: The report of the Exhibition will be published. I shall very probably incorporate this in the Exhibition report. Now, to show what can be done with even very soft fruits, the New York Experimental Station sent over to Col. Bracket, who was in charge of the United States fruits, a collection of about 50 varieties of pears, and among these, there were, I think, about 12 or 14 varieties of American plums. Those are among the softest fruits that we have to handle; while the skin is a little thick the plum is so juicy and soft that I had no idea they could be carried that distance and still be shown presentable. Among those fifty varieties, however, there were about two-thirds of them came out in good condition. I will give you the names of some of those that I saw that were practically perfect: Wyant, Hawkeye, Fall Pride, Loomis, Nonsuch, Archbishop, Duke, Moyer—these are mixed-up American and European varieties—Golden Beauty, Copper, Belle de Septembre, Lafayette, Diamond, Yellow Egg, Jefferson, Aitken, Prince of Wales, etc. There were about forty of those varieties on exhibition for nearly a week, before they began to give way, so that I think the evidence we have accumulated in connection with the Paris Exhibition is such as to show that even the softest fruits by taking great care in packing and in handling can be carried a long journey like that and still come out in good condition; and if that be the case, who can say that such apples as the Duchess cannot be sent over, and other fruits that we can grow in great quantity, which are infinitely harder in texture than these fruits that we have been speaking of? Gentlemen, there is no practical difficulty in the way.

Mr. E. D. Smith: Do you know what part of the States these were from?

Dr. Saunders: From the Experimental Station at Geneva, in New York State. I do not know whose apples Mr. Allan was handling, but he told me he had sold 4,000 boxes of Duchess in Liverpool before he came on to Paris at very good figures; and if one man can get over 4,000 and sell them to advantage there is no reason why others should not do the same thing. I believe there is a great market for our summer apples there. I was surprised in going through the large cities in England, during the month of August, to find that they had not anything there practically in the way of fruit except a few oranges. There was the greatest scarcity of fruit, and the early apples, miserable little things not very much bigger than Transcendent Crabs, a home growth, were being cried up in the streets as wonderful samples that everyone was invited to buy, and they were such apples as we would not think of doing anything with except making cider of

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them; and at that season our early apples would I am sure bring good returns to the senders if they were well put up and proper arrangements made for ventilating the ship, or giving them cold storage on the way over.

Mr. McKinnon: What is your idea of the export of peaches; is it likely to prove a success?

Dr. Saunders: I do not think peaches are likely to prove sufficiently remunerative taking one lot with another to warrant their being sent over in quantities. I have not really investigated the matter very largely, and I am giving only my personal opinion, but there was a good display made in Liverpool from the last lot that was sent over in cold storage. I think they were sent over under the auspices of the Ontario Government. It is well worth a trial that we should send them over, and they fetch such good prices that even if you get half of them there in a sound state, that might probably pay very well; but what I would certainly wish to hold up as a branch of trade that might be developed with great profit, is the shipping more generally of the early summer apples such as will carry fairly well, and such apples as we have in great abundance and do not know what to do with. I believe they will bring remunerative prices there, and I do not think that our fruit growers or our people anywhere will have any reason to advocate the cessation of further planting of fruit trees for fear that the market will be over-stocked. I do not think there is in England at the present time one person in five who has ever tasted Canadian apples, yet they would be very glad to get them if they only knew how to proceed to do so. There is a great prejudice in England in favor of Canadian goods, and it is one of those conditions of mind which we ought to make the very best use of that we possibly can and get our end of the business worked in with all the energy and force that we can command. (Hear, hear)!

Mr. Murray Pettit: Do I understand you to say that these Cox Orange Pippins that were sold for 30 shillings were grown near Montreal?

Dr. Saunders: They were grown in England, and these were a select lot which had been shown at some exhibition, I think in London, and they were offered for sale and they promptly sold for 30 shillings a bushel. The Army and Navy stores are selling Fameuse at a guinea, that is 21 shillings a bushel. I fancy more of them would have been taken at the price, if they had been available.

Mr. Shuttleworth: It is a very limited demand when you get to those high prices; I have been there; when you get beyond a certain quantity the consumption drops right off.

Dr. Saunders: Have you ever seen any perfect samples of apples offered for sale, well sized, even in color, and in perfect condition, such as those Ribstons, and those Cox's Orange Pippins were, and did you ever see any of those sold at a low price?

Mr. Shuttleworth: Yes I have seen them sold in the Cochran case even. There is one thing I would like to mention and take issue with. The knowledge of Canadian apples is much more widespread than one would gather from Dr. Saunders' remarks. I am inclined to think the Doctor's friend is an astronomer.

Dr. Saunders: No, sir, he is a zoologist, (laughter), and there is no part of the world he has not hunted over for animals, but he is not a pomologist.

Mr. Shuttleworth: A great many Canadian apples have been sold heretofore as American apples, but it is not so now—Canadian fruit is being sold all over.

Dr. Saunders: I said I did not think there was one person out of five that had tasted Canadian apples. Well, there are six millions of people in London alone, and if a million and a half had been consumed that would have been probably all we have sent over. There was another matter I was going to mention, and that was the importance of having our apples branded. In going through Covent Garden Market my friend would say in looking at the Nova Scotia apples: "Now, here is such a man, there is no need of opening his barrel, nobody wants to have the head taken of, we can sell them at a higher price than that of these people who are not so well known." He mentioned several lines where the character of the brand was sufficient guarantee of the quality of the fruit, and when that was once established in the market there was no difficulty in selling any quantity of that brand. Mr. Allan told me his great trouble was in supplying these orders. If he went into the market and took hold of three or four thousand barrels of apples, and they were sent over by ordinary packers, he would have to over-haul them all, and there would

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probably not be half of them that would stand the test of examination. I presume there are quite a number here in the Niagara district, gentlemen, who have been established a long time, whose brands are well known, and I have been told that their experience is much the same, that their brands will generally sell their apples at a little higher than the ruling price for fruit at that particular time, showing how important it is that we should try and sell such fruit as we can over there, on which it will be self-evident from the brand that the fruit is of the character it claims to be. There has been too much fraud practised; I say fraud, I do not think it is characterizing it too strongly—(A voice, "Not a bit.")—in marking a barrel first-class when you find in the middle of it perhaps half a barrel of third-rate apples; and when people have been two or three times misled by buying such apples it is very apt to discredit the fruit to a very large extent. We cannot be too careful about the quality of the fruit, and about the sizing of it and about packing it well, and if we do our duty at this end of the line, I feel certain we will reap our reward.

The PRESIDENT: Is there a possibility or a probability of the production of the Blenheim Orange apple being largely increased in England?

Dr. SAUNDERS: No, I do not think it. The English people are moving very slowly in the improvement of their orchards. I was through Kent and Devon, and some other counties where fruit is grown largely, and I saw very little good fruit. The nurserymen are all growing good varieties of apples, and in the exhibits they were showing plenty of good apples very well grown, fine specimens; but you go through the country and I believe that fully one-half the specimens are seedlings; they are poor in quality and in many districts they are grown for cider; and what astonished me more than all was in going through France. I went down in Normandy where apples are grown very largely, and there is quite a considerable portion of the land given up to apples there, all grown on trees that begin to branch at about eight feet high, so that the cattle can get around underneath and the horses plow the land, and the cattle pasture on it without any danger of injuring the fruit, but I scarcely saw a good variety of apple in the whole country—they are nearly all cider apples. In discussing with the pomologists there who claim to understand what is desirable for fruit in their country, they claim in the first place there is no cider in the world equal to the Normandy cider, and the Normandy cider, to be first quality must be made from these miserable little crab-like specimens, some of which are sour, some are bitter, some are acid, some awfully astringent. I tried a number of them on the trees, but these intelligent men, arguing with me, said, "This is the natural way to make good cider, we have proven it." I said, "Do you take any definite proportions of any of these apples?—Here is an apple that is sour, here is another that is intensely sour, another one bitter; what proportions do you use?" They said, "Oh, we do not consider that question at all; we have to have a mixture, and it is when we have the mixture we can make the very best cider that the world can procure." I must say I could not drink the cider. (Laughter and applause).

A. H. PETTIT: I want to express my great pleasure in hearing and gaining so much information from Dr. Saunders' remarks in regard to our fruit in the British market. I have no doubt there is a good deal of ignorance among the masses of the people at least in regard to the quality and the capabilities of our country in the production of fruit. In regard to packing fruit in excelsior, I fear we may get in the position I got in this year in shipping apples to the British market. Last winter I had the pleasure of being present at the annual meeting of the Nova Scotia Fruit Growers' Association, and there the discussion of the apple barrel came up. I was very much taken with the shape and form of the Nova Scotian apple barrel, being a little bit shorter, and not so wide in the bilge, so I came home with the intention of having such barrels made to ship in myself this year. I will show you the difference between our barrel and theirs. (Placing one barrel on top of the other). Now, the teetering and jarring from this part of the country to the British market would be such that every apple in that barrel must be bruised, but the Nova Scotian barrel will lie so that the quarter hoops rest one on the other, and the bilge scarcely touches it. Therefore it will preserve the fruit from bruising. Now, the quantity contained in those barrels is not so important as the condition in which we land them in that market. If we can land them there in prime condition we are all satisfied we will get a reasonable price, if not a good price. I think there is nothing

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better than excelsior to use in packing our fruit. I believe we can land peaches in the British market in prime condition—(Hear, hear)—if we will only take the pains in packing and can secure accommodation, and this we as growers cannot secure ourselves. We are not sure of our fall crop every season, far from it. We have our light crops and our full crops. Our steamship companies say, "Providing you take the whole space, then we will give you the temperature you require, if you fill the space." We cannot take the whole space and keep it, but if through the Government's assistance they will secure for us cold storage at proper temperature, we will place any of our summer fruits in the British market in good condition. I do not think there will be any trouble in that respect, but one or two things have to be guarded against. With the Hanrahan system we would get a circulation and pure air. If you get those two conditions, and then get the space, I am satisfied the fruit growers of this country will have no trouble in filling the space, but they cannot do it under the conditions that have existed in the past; one shipment will arrive in good condition, and another will not. It shows faulty atmospheric conditions in the compartment. Last winter I had the pleasure of talking to a gentleman, who though he did not know much about the fruit business, had built in the steamships of this country pretty nearly all the cold storage compartments, and I asked him what he thought about our fruit shipments in cold storage. He said, "You will never succeed in landing fruit in the British market under the present system of compartments upon your steamships; they are not suitable for the fruit business; they are capital institutions and right for anything like butter and cheese and one or two other products, but if you put the fruit in those compartments it will not succeed." Now, I don't believe we will have the least difficulty in landing the most tender varieties if we will only use care in packing and picking from the tree and placing in cold storage under this system with a current of air which throws off the impurities as they arise, the ice giving you a cool and pure atmosphere. Let there be no delays. When the ripening process is commenced you cannot stop it. It is like decay in meat; if the decay commences at the bone you cannot prevent it afterwards. I am very thankful and pleased to hear Dr. Saunders' remarks in regard to wants of the British public in the way of fruits. We are probably as ignorant of their wants as they are of the existing conditions in our country. In regard to the Vicar of Wakefield pear, I have always understood and have frequently been told by men who ought to know, that in England they rent these out to place upon the table as ornaments—they are not supposed to be eaten. (Laughter). I supposed that was the reason our people had been shipping those Keifier pears; they would be good keepers, and they were very nice looking.

Mr. Caston: The great trouble in the old country shipments is the slacks, and the object of the pressure of the barrel in packing tightly is to avoid slacks. There is something in the shape of the barrel as Mr. Pettit pointed out.

REPORT OF COMMITTEE ON GRADING AND INSPECTION OF FRUIT.

The President called for the report of the Committee on Grading and Inspection of Fruit.

A. H. Pettit: We do not wish to submit a report that cannot be passed, therefore I think we should carefully consider this matter before we discuss it and ask for any amendments or additions to the present Act. Both sides of the House were opposed to this Bill when it was before the House. I would suggest that you appoint a committee covering the whole Province as near as you can to discuss carefully the ins and outs of this Inspection Act, and, if you can improve or in any way assist the Government to get a measure through that will fill our requirements, I would urge you most strongly to do so.

The President: You will remember that a committee was appointed last year to carry out the wishes of this Association in regard to grading and inspecting. That committee has met during the year and has done some work, and they have prepared a Bill which has been sent before the Minister of Agriculture for the Dominion, and, as you know, presented to the House. Now this Association has never heard that Bill,

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unless it has been read privately, and I think it would be well if the chairman of that committee, Mr. Pettit, would present that Bill for the consideration of this meeting, so that we may debate it and hear the opinions of the gentlemen present in regard to it, and at the close of that discussion appoint a committee to embody the particulars that are brought out by that discussion.

Hon. Mr. DRYDEN: Is any one able to say whence the opposition to this Bill came? Your public men are but the exponents of public opinion. They will drift wherever the public opinion is likely to go. The opposition Mr. Pettit speaks of, which was seen in the House of Commons, was originated somewhere. Now I do not think it originated from such men as we have here. Where did the opposition come from? What was the underlying thought in it? My impression is that it came from the dealers. (Hear, hear.) You see they are a different class of people from what you have generally represented here. You had better ascertain that, and then ascertain why, and get at the bottom of the difficulty. If there is any real objection, then you gentlemen ought to know it and ought to try to meet it, because you cannot expect legislators to carry out what they believe is not in accord with public opinion. They will bring politics into it. They see it is not politic to do it.

E. D. SMITH: I read the discussion that took place in the House, and I do not take it that you can strictly say that those gentlemen were, many of them, opposed to the Bill; they were rather criticising it and seeking to get it into shape. Almost every member of the House agreed that something should be done, and that an Inspection Act of some kind or other should be put on the statute book; but as was perfectly right, men on both sides of the House met with criticisms in regard to various features of the Bill. I believe that if the Bill had been pressed it would have been passed in some shape. A year's experience in packing and handling apples, since that time, has brought to the attention of apple packers particularly, many features of the Bill which were not thought of at the time; and I think that discussion in this meeting by the best men in the fruit industry in the country would bring out points that would enable a committee to be appointed which would perhaps suggest some improvements on the Bill as it was brought before the House.

The PRESIDENT: I will ask that the Bill be read, and then we will hear from a gentleman representing the Apple Packers' Association of Ontario.

The SECRETARY read the Bill.

Mr. EBEN JAMES, representing Woodhall & Co., Liverpool: The question has been asked where the opposition came from to that Bill, and I beg to say that one of my clients who exports some 10,000 barrels in a year, wrote very strongly to the Government protesting on the ground that while he might handle any quantity of apples in a year it was impossible for him personally to see to the packing of the fruit, and while his intentions might be of the very best, in many cases packers were not reliable, and where he was responsible for from 1,000 to 10,000 barrels he might ship, he might incur a terrible penalty on himself and it would be very unfair because he could not guard against it.

A. H. PETTIT: Our committee should represent the fruit industry all over the country as widely as possible. If we can, without injuring the Bill, meet the wishes of its opponents, let us do so, and put it in a shape that it will be carried. If we make it arbitrary and contrary to the wishes of the public it will be difficult to enforce it, therefore, let us give it careful consideration before we ask for any changes in the matter. I seriously think a report read at this meeting before we had discussed this matter fully would be the worst step to take in regard to the amendment or the further urging of the passing of that Act.

The PRESIDENT: I will ask Mr. Shuttleworth to speak.

J. M. SHUTTLEWORTH: I may say that I do not represent the Apple Shippers' Association, but if I may preface my remarks by a few words I should like to say that last week at a meeting where between 200 and 300 apple shippers met, this Bill was condemned in its entirety. I did not agree with that condemnation. There are some points in this Bill that I think will be of great advantage to the export industry. The position that I have taken is this: Why make this Bill applicable only to apples and pears for export? Why not make it applicable to everything? (Hear, hear). Why make fish of one and fowl of another? There are just as many fraudulently packed packages in peaches and grapes and plums as there are apples. I have sometimes been ashamed even to own

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the Canadian apples that were shown in Liverpool—ashamed almost that I was a Canadian, from fraud in the packing, and that is why I will support with all my influence and energy a Bill which is brought forward to punish fraud in the packing of fruit, (hear, hear); but I want it applicable not only to apples and pears for export, but to everything. There should be no difference. If fraud has been perpetrated upon a purchaser or consumer of fruit in Great Britain, if you are going to punish him, why not punish the perpetrator of fraud upon a consumer here in Canada? (Hear, hear) I think you will all agree on that, and I do not see that there should be any objections to that. The main object I have in regard to the inspection of fruit is this, if this export fruit trade is worth a rap it should be nursed in every way, shape and form. While I am not an extensive grower—although I do grow some apples—I am interested in the export fruit trade possibly as much as any one here. I have been in the export fruit trade for the last 24 years; I have been at both ends of it; I have had my ups and downs with it, and I have seen some of the difficulties, and have been fighting every year since I started for honest packing, and almost fighting single handed in a great many ways. Now we know that in shipping there is nothing we have so much trouble with as in getting despatch. You have had this trouble with perishable fruits, as Dr. Saunders has mentioned. That is almost as important with apples as it is with other fruits. If these apples must be inspected where are we going to inspect them? We cannot send an army of inspectors through the country to do it; it is impossible. We cannot inspect them at the station, because we would have to have an army there. If you are going to inspect them at Montreal it will kill the trade, because we cannot get the fruit away quick enough now. It will delay shipments sometimes a week or two weeks.

Hon. Mr. DRYDEN: Is that the idea of the Bill?

Mr. SHUTTLEWORTH: I think so.

The SECRETARY: A barrel of apples is subject to inspection, that is all.

Mr. SHUTTLEWORTH: A barrel of apples that has been once inspected can never be put back in the same shape that it was before, and that means that the shipper has got to lose it; the Government will pay for it. I would certainly not pay freight on it.

Hon. Mr. DRYDEN: That is not my understanding of what was proposed. I did not understand that anyone proposed that you were going to inspect every barrel that went across for export or anything like it, but I thought that they were declaring a law against fraudulent packing, and that they were appointing certain persons who would have a right to inspect, but who might not inspect probably any of yours for some time, but once and a while, if they had any suspicion, they would have the power. You would know that and try to protect yourself. Now I think that is the way the idea was intended to work out. We have a law on our Ontario Statutes in the same way in reference to these small fruits. Persons packing strawberries or raspberries in little boxes are liable to get into trouble under that law, but there is very little of it done; the very fact that the people know that that is the law and that they are liable to that trouble, makes them take pains to pack their fruit right. I understood that was the thought of this Bill.

The SECRETARY: Yes, that is it.

Mr. SHUTTLEWORTH: That may be, but the point is this: suppose I make a shipment to Montreal, the Inspector goes and he opens up one or two barrels of apples that I am shipping; those one or two barrels I might as well throw away here and not pay freight on them

Mr. DRYDEN: You could sell them.

Mr. SHUTTLEWORTH: What would we sell them for?

Hon. Mr. DRYDEN: I do not think you would lose so very much that way, but I do not think that is the right place to inspect; I think the inspection ought to be done some place nearer home if you are going to have any inspection.

Mr. SHUTTLEWORTH: But the trouble is it will take almost an army of men to do that.

Hon. Mr. DRYDEN: You are quite right, if you are going to have any inspection at all it must be along the other line; somebody must have the power to inspect without compelling them to inspect, because if you compel them to inspect you cannot carry on your business.

Mr. SHUTTLEWORTH: That is what I say; you cannot carry on the business if the inspection is compulsory. My objection is first, that we ought not to make one branch

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of the trade a scapegoat; another is that you cannot inspect them at the port of export; and a third is, why compel me to have my fruit inspected? If you are suspicious that bad work is done, then I grant that you have the right. Because every barrel that has been inspected I have to lose upon, there is no compensation. If there was compensation I would say, all right, inspect them, because that very safeguard would be a safeguard to myself. The great trouble has been in the past, any fault in the packing has been largely the result of buying what we call in the trade "lumping orchards." (Hear, hear.) The men who buy those apples are very often sent out to do that work. They will underestimate the crop and then endeavor as far as possible to gain the confidence of their employer by making numbers of barrels so as to make the deal look well. I can confirm that.

Mr. Caston: That is true.

Mr. Shuttleworth: If I buy apples, as a rule I buy them at a price for first-class fruit, and I am paying for first-class fruit. Generally speaking the fraudulent packing is not done by the buyer who operates himself, and who under this bill would be punished for the offence of another.

Mr. McKinnon: Would not the results of this bill be to prevent the buying of whole orchards and to cause buying by the number of barrels of really No. 1 as they happen to be in the orchard?

Mr. Shuttleworth: It might help it, but I don't think you can compel a man. You must not interfere with trade.

Mr. McKinnon: If he refused to buy in that way would it not be fair that he should lose by employing incompetent packers?

Mr. Shuttleworth: He usually does lose, because when these apples are turned out the fraudulent packing is known more by the people who buy the fruit than it would be by the inspectors. When the fruit is shown in London, or Liverpool, or Glasgow, one barrel is turned out in a large basket and it comes up in a hydraulic hoist, and you see whether it is properly packed or not. I think the Government has taken the right step in sending a competent man over there and getting the names of the shipper and the packer of the fraudulent barrels and exposing them here; and, if there is any thought that this fraud is being operated continuously, such a packer's apples should be inspected here. I think that is very fair.

Hon. Mr. Dryden: Would not the ideal system of packing these apples be that the man who produces them should pack them? It does not make any difference who does it, if they are required by law to be packed in a certain way, the man who puts the mark on them is responsible. Would not that be an ideal system instead of your sending an army of men around the country, a sort of professionals? For instance, I have a little orchard, ought not I to be the man who should be responsible for the packing of those apples, then let the inspector come along and fine me if I am doing wrong; then you who are the dealer would feel that you were guarded. You say, "This man has picked those apples, he has marked them so and so, he is responsible, and if I find that there is anything wrong I will see that he is punished." How would that work out?

Mr. Shuttleworth: I do not think there is one grower in fifty who knows how to pack apples.

Hon. Mr. Dryden: They would learn.

Mr. Shuttleworth: They would learn, but during that education who would pay for the losses?

Mr. Carpenter: Is it necessary that the apples should be inspected as they are inspected in the Old Country, or is it enough to take the head out of the barrel and look into it and pack it up as good as it was before without any injury to the fruit?

Mr. Shuttleworth: He can't do it.

Mr. Carpenter: He can do it so as to tell you whether they are good or bad.

Mr. Shuttleworth: I have seen a barrel of apples packed so scientifically that until you got into them you could not tell where the robbery was. It was there all right, but the bad ones were inside.

Mr. Carpenter: I venture to say that in 99 cases out of 100 he would be caught if the inspector took one stave out of the barrel.

Mr. Shuttleworth: I know some packers that I will defy you to catch them.

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The SECRETARY : What would be good sizes for the variety named ?

Mr. SHUTTLEWORTH : Take Spy this year, may be three inch apple would be a fair size. In another year or another district, two and a half.

The SECRETARY : Why not mark two and a half inches on the barrel ?

Mr. SHUTTLEWORTH : The trouble in doing that is that it is almost impossible to grade them straight in that way. You could not get over the ground.

Mr. TWEDDLE : Use a grader.

Mr. SHUTTLEWORTH : I do not think it would be possible to use a grader, the time will not allow, I will give you my reasons as stated in my letter to Hon. Mr. Fisher. (Letter of May 15th, 1900, read.) I do not know that I have anything more to say in the matter. I shall be very glad to do what I can. I am as much interested in this fruit trade as anyone possibly can be. I have been at it a long time, I understand thoroughly the great many difficulties we have to contend with now, and I have been ashamed of the fraudulent packing as it has turned out in Liverpool, Glasgow, and London market, and particularly in 1899 the fraudulent packing was very prevalent, and was a disgrace to the country.

A DELEGATE : Is that in the fault of the apples or the slacks ?

Mr. SHUTTLEWORTH : No, sir, it was the fraud of the packing. An Englishman knows when he sees it turned out whether it is a fraudulent packing. He knows where the fraud is, and if he pays for fruit he will have to get the best price he can for it.

Mr. MCNEILL : What is the cause of that fraudulent packing ?

Mr. SHUTTLEWORTH : A great many operators bought orchards and erred in judgment in sizing up the quantities on them, and they wanted to hold their credit with their employer, and they made barrels, it didn't matter what they were made of.

Mr. BOULTER : They ought to have gone to an evaporator.

Mr. SHEPPARD : Yes ; a good many ought not even to have gone to the evaporator.

Mr. MCNEILL : It was not, then, the fault of the grower, but of the employee ?

Mr. SHUTTLEWORTH : Yes, more than anything else. There were no doubt orders given in some cases to make as many barrels as they could out of the orchard.

Mr. BOULTER : That is not so prevalent this year ?

Mr. SHUTTLEWORTH : No, I think the fear of this Bill has had something to do with it ; it has been a deterrent.

Mr. BOULTER : Do you not think the loss of the money to the shippers themselves has had something to do with it ?

Mr. SHUTTLEWORTH : Yes, and the fruit was better than it was last year.

Mr. EBEN JAMES : I think it is rather a hard matter to examine the stuff in Liverpool, for the simple reason that the season is very short and the probabilities are that when you have packed your apples it will be fourteen or fifteen days before they are sold in Liverpool, and if that fraudulent packing is just discovered, unless a man cabled at very great expense it would be another ten days before a letter would return, and in the meantime this man has several thousand more on the way. While the apples would sustain some little damage in being examined at the port of shipment, I think it is the only place they can be examined and I think the benefit to the trade generally would accrue by taking out a barrel now and again, providing the best care was taken to replace the apples and have only experienced packers to replace them. The loss would not be very great, and the benefit would be so much that it would more than overbalance. We cannot wait for one month to have the returns in from Liverpool to know how these men are shipping, and, as stated, it would be impossible to keep agents at every station to examine the goods as they go through. Cheese is bored in the same way. A man might argue that because a cheese is bored it is damaged. Well, it is damaged to a certain extent, but what dealer in cheese objects to the small percentage of the carload being examined that the whole may be classed ? I think the same thing applies to the apples. It would be less expensive and it would be beneficial to the shipper himself, because he is informed himself of the fact that such a car that he shipped has not turned out right, and he is telegraphed to and he can find out what packer it is that is not doing his work right. He may have twenty-five different packers all over the country, and if he has some slight countermark on the barrels he can spot the man at once, and it is for his benefit as well as that of the buyer in England.

Mr. ASHTON, representing the Exporter's Association : I should say that the best way to get over the difficulty would be for the fruit-growers to have their local associa-

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tions to pack their own fruits and have an inspector there to look after it, as they do in California. That would get over the fraudulent packing of the fruit.

The SECRETARY: I hope that the apple exporters will fall in line with us by and by. Some of us in Grimsby have been trying this method of sizing our apples, something after the manner that was suggested by Dr. Saunders in his address, putting a uniform size in a package and labelling on the outside the minimum size in that package. Our apples, for example, were labelled on the outside, diameter 2½ inches, then the next size was 2¾, the next 3 inches, etc., so that, when the buyer bought that package, he knew there was nothing in that barrel less than 2½ inches, etc. He knew exactly the sizes he was buying. We found that to be a very fortunate undertaking, a very wise course. Through that means I have secured a customer in England, who has ordered by size, and when he orders apples he says, "I want so many 2½ inch and so many 2¾," and he pays accordingly He is willing to pay for graded fruit accordingly. Not only that, but I got another order from Newcastle in the same way; and I am confident that we could get double the money for our fruit put up in that shape, if we could establish the confidence of the English buyer so that he knew exactly what he was buying, and he would not need to wait to see the apples to know what they were; we would not then have to ship on consignment because the buyers in England would simply order from us so many apples of such a size; and I believe it would solve a great difficulty, and Mr. Shuttleworth would find by and by that it would work out to his advantage as well as to ours. Perhaps he might not ship on quite such a large scale—a single shipper might not be able to handle so many and get them all graded—but he would get more out of them. Allow me to show this package. (Package with printing on outside, "Variety, diameter, shipper's mark.")

Mr. SHUTTLEWORTH: I do not raise any objection to the sizing of the apple, but to the compulsory inspection where the loss would be sustained by the shipper; another thing is that it cannot be very well done on this side or at the port of export. I object also that the export fruit trade alone should be made the scapegoat.

Mr. ELMER LICK (Oshawa): I think that for some time it would be impossible that any Act for the compulsory inspection of all apples could possibly be put through, or carried into effect even if it were adopted. We have not the machinery to do it; we don't know what would be needed. But is it not possible to establish under Government supervision and inspection some grades which shall be carefully inspected? I do not think that the inspection of three or four barrels out of a carload would be a serious injury to those apples, if carefully done; a few more barrels could be provided to put in, or an extra head to tighten them up all right. I think the only place to inspect them is at the shipping port—(Hear, hear)—because you have no full control of them in any other place. The only place is at Montreal or the other port of shipment, allowing shippers to use a brand and prohibiting anyone else from using it, and if the apples do not come up to the grade on inspection, then remove the brand and substitute something else. Every man must put his name on that packs apples. (Hear, hear.) Some men are packing apples in Oshawa at present, and what are they doing? They are putting up 100 barrels of No. 1 apples in good shape; there would be perhaps 40 or 50 barrels of seconds. Do they put their own name on the seconds? Not a bit of it. Do they put on any definite name or brand on the whole? No; they put a brand on about 15 or 20 of a certain name, and then put another one on 15 or 20 more—trying to create the impression that it is the farmers that are dishonest and send over those small lots, and they are all bunched up in the carload. (Hear, hear.) I do not want to be forced to give away this information, but I happen to have been appointed one of those employees. An apple buyer came into my orchard last year, and he bought apples and offered every cent they were worth, and more, I thought, and we sold them. What did he do? He took 100 barrels of stuff out of that orchard that never ought to have gone into barrels, only to the evaporator, and he sent them to the English market under some such roguish brand as I have indicated. Now, we have got to stop that sort of thing. (Hear, hear.) How are we to do it? Go right straight at it, and ask the Government to give us something that we can all unite on. I do not think it is very hard; I think it can be done easily. I believe Mr Shuttleworth and every man here will agree that we can put the minimum size of our apples on the barrel. In time we can work up to fruit that will be a greater advantage to us than the firsts and seconds. I have been like others—when seconds would bring a good price I have shipped them. I think we would have

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made more money if none of us had shipped seconds over to the English market; but if we are going to do it, always put our name on and insist on everyone doing it. I hope before another year comes round the Act will be passed, and will be put on a working basis that will help us to maintain the name in the English market for our apples, which, I am sorry to say, is not as good just now as it ought to be. (Applause.)

Mr. McKINNON: Let me call attention to one statement of Mr. Shuttleworth's—that it would be impossible for large packers having gangs out all over the country to see to the proper, honest packing of all the fruit that they export. It seems to me there is a fallacy in the assumption upon which that statement is based. Is it at all necessary that Mr. Shuttleworth or anybody else should ship 10,000 barrels of apples? Is it not better that he should ship only 1,000 barrels of apples and do it right, and let nine other men ship the other 9,000, than that Mr. Shuttleworth should ship so many apples that he finds it impossible to grade properly? To use a vulgar phrase, some apple packers bite off more than they can chew properly. Let us have more packers that can attend to their business more closely, and hold them strictly responsible, and let them grade their apples so that there will be no doubt about it, and that they will not be afraid of inspection. During Mr. Shuttleworth's remarks on inspection I was reminded of the saying of a very wise man of old, "The wicked flee when no man pursueth." (Laughter.)

Mr. SHUTTLEWORTH: I do not want you to infer that I am standing here and denouncing that Bill altogether. What I want to get at is the man who fraudulently packs apples or any other fruit, because in doing that I am being protected, and that is what I want to be.

Mr. McKINNON: We do not want to protect you; we want to catch you.

Mr. SHUTTLEWORTH: I would infer that you mean that we fraudulently pack, or other men fraudulently pack. I say no, shippers do not; it is not to their interests.

Mr. McKINNON: They allow others to do it that they may build up a big trade.

Mr. SHUTTLEWORTH: That is not so. How many apples would you say this country would have sold this year if it had not been for the operators?

Mr. McKINNON: What we want is small operators who can attend to their business.

Mr. SHUTTLEWORTH: I quite agree that a great many more men would make more money out of a thousand barrels than out of 10,000 barrels under present conditions. To punish the men who fraudulently pack is what we would like to have done, and I think those one or two clauses are all I object to.

Mr. McKINNON: Those one or two clauses are what just fit.

MR. LICK: A man may come into our section and buy 6,000 or 7,000 barrels of apples; do you mean that man, or the man who does the work?

Mr. SHUTTLEWORTH: The man that does the work.

Mr. LICK: In one case we sold our orchard by contract, and the men were to put those apples in, and they said, "We don't want to do it," but the man who bought the orchard said, "Yes, everything has to go in"—and they shoved the dirty and the wormy apples in the barrels.

Mr. SHUTTLEWORTH: He is a fraudulent man.

Mr. LICK: According to your argument the man that put them up would be punished, and not the man that really was to blame.

Mr. SHUTTLEWORTH I think the law would get hold of him as well as the other, so that if he gave instructions for his employees to do that he would be punished.

Mr. LICK: Is it the employees of the fraudulent man or the fraudulent man who gave instructions? From what I have seen in many years I think that it is the buyers.

Mr. L. B. RICE (Port Huron, Mich.): I am an outsider and ought not to say anything, but I think that this whole thing is class legislation. Last night I attended our Merchants' and Manufacturers' Union Association, and we had a long discussion about butter, and after spending the whole evening we concluded it was class legislation and unconstitutional entirely, and that we were on the wrong track. As with butter, so with apples. If an apple man can have special legislation in his favor, next the potato man comes up and he must have special legislation in his favor, and next the butter man and next the cheese man and next the lumber man, and all the men in the country, every man must have special legislation. What kind of lawyers are you going to get that can carry all this thing in their heads, so that they can carry a law suit through? What kind of a judge can you get that can give you any kind of a decision? Now, make a law

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that any man who commits a fraud in any way in putting up any sort of a package, or material, is a criminal one, and when you get that man see that he is prosecuted. (Hear, hear.) Let your apples and your potatoes and your butter and everything else go, but make general legislation, so that you will hit the whole thing, and then you can't be accused of class legislation, and you won't have other men coming in and asking for legislation for themselves.

Mr. BOULTER: Any man who puts goods up or offers them for sale should have his name on them. Fifteen years ago we had a statute passed at Ottawa that is very short; it just means that, if I put a can of goods up and do not put my name on it, I am liable to $2 fine on that can, $24 on a whole case. We investigated a case in Montreal and the fine on that one car of goods was $12,000, but the whole thing was reduced to a nominal fine. Another case was withdrawn from Toronto and the goods sent to Montreal and re-labelled. I think if you insist on the name of the packer being on the barrel of apples you are going a long way in remedying the evil. In our country last year the buyers went wild, and men were ruined up to $30,000, $40,000 and $50,000, and the bank would not advance them a dollar this year to buy apples. Last year they bought orchards, and instructions were given that something must be made out of them, and apples were packed that should have been ground into cider. I saw apples in Liverpool and London that I was ashamed of. A man handling 1,000 barrels would probably handle them more particularly, but if Mr. Shuttleworth gives proper instructions to his men he can properly handle 10,000, but he should put the packer's name on them.

Hon. Mr DRYDEN: Who is the packer?

Mr. BOULTER: If I am in the business and go out to buy apples in this country I should be responsible for what I do. Mr. Shuttleworth should be responsible for the men that he sends out to buy apples. Let him instruct those men, and if he hasn't a man that is good enough, discharge him and give $1 a day more and get a man that will do what he tells him to do. His duty is to send a man around once and a while and see that these men are doing their duty. You can soon remedy this evil if the Government insists on making the man who handles the stuff responsible. I am responsible for the stuff that I put up. Mr. Shuttleworth should be responsible for sending out men that are proper and right, and then Mr. Shuttleworth must put his name on the packages.

Mr. SHUTTLEWORTH: I want to do that.

Mr. BOULTER: Discharge the man that doesn't do the right thing. Mr. Dryden's idea, was something like the inspection of our cheese factory. A man soon gets caught that leaves his milk can out in a rain storm. (Laughter). A man does not like to be caught red-handed in it. You would not have to inspect a whole car. Inspect one or two barrels, and if one or two or three barrels of that car turn out bad, dump the whole car, and you will stop this fraud in a little while.

Mr. RACE: The purpose and spirit of this Bill is all right, but it seems to me that you are aiming at removing the evil in too short a time. Why should not a bill be drafted to operate in this connection the same as bills are in connection with other evils that we have? Take the License Act for example. If this Bill was drawn up with all those provisions, with the penalties attached, then appoint an inspector for a county, or a group of counties, and give that inspector similar powers to a license inspector. It is not supposed that a license inspector is going to drop on to a hotel keeper and make an inspection of every class of liquor he sells or of the trade he does, but that hotel keeper is liable to be dropped upon at any time. Now, if you had three or four inspectors for the Province of Ontario under the provisions of this bill, every man that was packing apples would feel that he was liable to be dropped upon, and after a year or two this thing would correct itself; but you can't correct it in a year. I have had some experience in drafting legislation, and I think I could draft a bill with the penalties attached and with alert inspectors so that it would impress the fact on every man that was packing apples that he was liable to be dropped upon. An inspector should have power to drop on those barrels of apples in the orchard, or at the point where they were being shipped, or in transit, or at the port of shipment and, if the people knew that they were liable to be dropped upon any time by an inspector, this thing would soon correct itself.

Mr. EBEN JAMES: The apple business only runs from September, and by the end of November everything is in store, and to go and appoint inspectors all over Ontario at remunerative salaries would entail a great deal of unnecessary expense I think one or

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two inspectors at the port of shipment would be all that is necessary. The system of buying up the orchards is acknowledged on all sides to be a bad one. I may safely say the instances given by Mr. Lick are an exception to the rule, and there is no one so interested in having good apples packed as the man that buys apples by the barrel from the farmer.

Mr. CASTON: But they are not buying them that way, that is the trouble.

Mr. JAMES: Yes, but they will buy them that way. This year they have been bought more by the barrel than they have for two years.

HON. MR. DRYDEN: This year is an exception. This year the price is away down.

A. H. PETTIT: The matter has been pretty well discussed, and I think the growers as a body are in favor of the Bill. Who is opposed? Is it the buyers? I understand Mr. Shuttleworth to say that the National Association of Buyers condemned the Bill in toto.

Mr. SHUTTLEWORTH: No, no; the meeting the other night condemned it because they did not quite understand the Bill; they wanted it to cover everything, and there were some clauses in it that they wanted eliminated.

A. H. PETTIT: If the shippers of Ontario are opposed to this Bill, I would suggest that a large committee of this Association representing all parts of the Province ought to invite all shippers to join us and discuss it together—(hear, hear)—and if we can amend it in any way to suit all, let us do it.

The Secretary then moved, seconded by Mr. H. J. Snelgrove, (Cobourg), that this matter be left in the hands for committee to report to-morrow, at the first convenient opportunity after conferring with the apple shippers present. After some discussion and suggestions, the following committee was appointed: A. H Pettit, G. C. Caston, W. H. Bunting, E. D. Smith, T. H. Race, T. H. P. Carpenter, E. J. Palmer, H. J. Snelgrove, D. J. MacKinnon, Elmer Lick, J. M. Shuttleworth, R. H. Ashton. Carried.

Mayor Cockshutt then extended to the members a cordial and hearty welcome to the city.

PRESIDENT'S ANNUAL ADDRESS.

BY W. M. ORR, FRUITLAND, ONT.

It is a pleasure for me, as presiding officer of this Association, to welcome you all to our annual meeting.

For forty-one years this Association has been holding these conventions in the different cities and towns of the Province, and, as a result of its missionary work, very many horticultural societies have sprung up in its wake, which are fostering and developing the latent fondness for gardening which exists in almost every breast. Our forefather, Adam, was a gardener, and if the human race has inherited a predisposition to sin, just as surely has it inherited a love for gardening. There is a truer pleasure in occupations and amusements which brings one in touch with nature, than in any other occupation or form of amusement.. I do not believe there could exist a really good man who did not in a more or less degree admire the natural beauties of garden, orchard and forest. The poets, the interpreters of our passions and indefinable yearnings, are pronounced on this point. Says Whittier:

"This day, two hundred years ago,
The wild grape by the river side
And tasteless ground-nut trailing low
The table of the woods supplied.

"Unknown the apple's red and gold,
The blushing tint of peach and pear;
The mirror of the Powow told
No tale of orchards, ripe and rare.

"Wild as the fruits he scorned to till,
These vales the native Indian trod:
Nor knew the glad Creator's skill,—
The joy of him who toils with God.

"O painter of the fruits and flowers!
We thank Thee for Thy wise design
Whereby these human hands of ours
In nature's garden work with Thine.

"And thanks that from our daily need
The joy of simple faith is born;
That he who smites the summer weed;
May trust Thee for the autumn corn.

"Give fools their gold and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a field, or trains a flower,
Or plants a tree, is more than all.

"For he who blesses most is blest;
And God and man shall own his worth
Who toils to leave as his bequest
An added beauty to the earth.

"And soon or late to all that sow
The time of harvest shall be given:
The flower shall bloom, the fruit shall grow,
If not on earth at last in Heaven."

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There is material in these thoughts of the influence of this occupation on its followers for a long address, but I must refrain.

During the season of 1900 we have suffered the usual attacks from insect enemies, but by a persistent and timely use of the spray pump, we are now able to successfully combat most of them. If we are to continue in the fruit growing business, we must make up our minds to fight these insects for ourselves. Our natural allies, the birds, have been so decimated through the wantonness of sportsmen and unthinking boys, that we have now more than our fair share of the fight to wage. We are now reaping our just reward for the destruction of our feathered allies. True, we have an Act for the protection of insectivorous birds, but who enforces it? It appears to be no one's special business and so is neglected. In the meantime the small boy and hungry pot-hunter from the towns roam at will over our fields and orchards and shoot everything they see. Even the little songsters do not escape. By this wholesale slaughter the horticulturist and agriculturists lose heavily. In justice to ourselves we should prohibit shooting over our farms. These people should be warned against trespassing, and heavily fined when caught. A little united effort is required, but it appears this is just what the good-natured farmer will not consent to put forth.

After the excitement caused by the appearance of the San José scale we have had a comparative calm. However, many think it is the calm before the storm. At the *demand* of the fruit growers in badly infested localities the Provincial Government has abandoned its original plan of destroying infested plants, but is enforcing fumigation of nursery stock, and an effort has been made to induce the fruit growers to apply the whale-oil soap treatment for orchards. Large quantities of caustic potash whale-oil soap were imported by the Department of Agriculture and sold to growers at a low price to induce them to experiment with it. You will hear this subject fully discussed during the meeting

The Provincial Government has granted us legislation in the matter of bandaging trees for the destruction of the codling moth under the Noxious Insect Act. This is a local option act and, although only approved of May 24th, 1900, it has been adopted in our own Township of Saltfleet, and I am very sanguine of its successful operation. This Act is a great boom to fruit growers and should be generally adopted. Men who will continue to breed noxious insects, without a reasonable effort to control them, should and can now be forced to destroy them, or submit to penalty.

The fruit crop of 1900 has been a splendid one in the Niagara Peninsula, and fairly good over the Province generally. Fruit growers have shared in the general prosperity of the country. The demand for our produce has been greater and prices decidedly firmer. The prospects for next year's crop are good. The trees and vines have made and matured an abundance of excellent wood, and the fruit buds are plentiful and in good condition.

During the year just closed, Canadian fruit has won high encomiums and golden opinions at the Paris Exposition, a full account of which has been given you by Dr. Saunders. During the coming year we will have the opportunity of exhibiting our produce at the Glasgow Exhibition, and at the Pan-American Exposition, in reference to which latter exposition Prof. VanDeman was expected to be present and give us an address. This subject will come before us for discussion.

The experimental shipments of fruit to Great Britain, undertaken by the Department of Agriculture for Canada, have been continued and shipments on somewhat similar lines have been conducted by the Ontario Department of Agriculture. This subject will be fully reported upon by Mr. Woolverton. We hope that the Department of Agriculture for Ontario will make such provision for the encouragement of our export trade in tender fruits as shall enable a company of fruit growers in any locality, wishing to make regular shipments of at least one carload each week during the fruit season, to have such conveniences of local storage and refrigerator car transportation to seaboard, and steamship space furnished them, as shall enable them to carry out their wishes.

We have tried to attract the attention of the British public with pictures of snow scenes, ice palaces, etc., until Kipling, the uncrowned laureate of the Empire, gives us the sobriquet of "Our Lady of the Snows." Now we have turned right about face. Let us have no more winter scenes. When Joshua would know of The Promised Land, he commanded the spies to "bring of the fruits of the land." We have, I believe, at last adopted the proper plan to represent our country in its proper light in the motherland,

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and at the same time open an almost unlimited market for our surplus production of tender fruits. Our object now as fruit growers should be to produce perfect fruit. It is not quantity but quality that pays It is the high grade fruit which alone can be relied upon to give us a high standing in either the home or foreign markets, and with such fruit we need never fear a glut. To accomplish this we must cultivate thoroughly, feed liberally, prune closely and thin severely. There is a great lack of knowledge along these lines, notwithstanding all that this and other societies have done. The experimental fruit stations throughout the province are doing valuable work, but their work is necessarily limited. In this way the best results cannot be secured. Fruit growers will never be satisfied until a central experimental fruit farm is established in one of the best fruit districts of Ontario.

The Ontario Fruit Growers' Association, together with the affiliated horticultural societies, is the largest horticultural association in the world. Through its membership and affiliated societies, it aims to be in touch with every fruit grower in Ontario. There are now forty-eight of these affiliated societies, and every year the number is being increased through the agency of Mr. Thos. Beall, our organizing director of affiliated societies. Only during the past month six new societies have been formed in affiliation with us, viz, at Ingersoll, Markham, Waterdown, Cayuga, Perth and Almonte, and the names will be added to our list for 1901.

An important feature of our work, and one that costs us more money each year, is the sending of lecturers to address the societies upon flower or fruit topics. The following lecturers have been sent out during the past year, and by their work the whole forty-eight societies were visited and thus kept in close touch with us, viz., Prof. Macoun and Prof. Fletcher of Ottawa, Wm. Bacon of Orillia, M. Burrell of St. Catharines, and T. H. Race of Mitchell, the first two without cost to us. The engaging of lecturers, the details of making up their engagements with the various societies, arranging the routes of travel and advertising their coming to each society, is a great increase of work for the office of our secretary, while the expense for paying the lecturer for his time and his travelling expenses is now becoming a large item in our yearly expenditure.

If this work of sending our horticultural experts to lecture before our societies is to be continued we must certainly approach the Legislature with a request for an increased grant, a request which we are confident would be viewed most favorably by the Minister of Agriculture.

The Canadian Horticulturist, our official organ, once a small sixteen-page monthly, is now a forty-eight-page magazine, ably edited, splendidly printed and elegantly illustrated. It is distributed monthly to each of our 5,000 members. It is being quite extensively quoted by British and other foreign horticultural journals, and in some cases whole page articles have been reproduced.

The development of the past decade in fruit growing, the largely increased consumption of fruit in our own country and the opening up of foreign markets show us that the possibilities of future development are practically unlimited.

It is our sad duty to record the death of Mr. Charles E Woolverton, father of our secretary, and one of our constituent members, who died at his home in Grimsby on the 16th of September at the advanced age of eighty years. He was always a regular attendant of our meetings in the early days of Arnold, Leslie, Burnett, Mills, Holton and others; and in his later years of quiet home life and constant reading, he was always in close touch with nature and with nature's God.

Only two of the gentlemen who assisted to organize this Association in 1859 still remain, viz, Mr. D. W. Beadle, of Toronto, and Mr. A. M. Smith, of St. Catharines. I would recommend that these two gentlemen, who have been so intimately associated with the whole history of our Association, be made honorary members of our association.

As the new century draws on us we stand upon its threshold full of faith, hope and confidence in our country, in our Association, and in our work as fruit growers.

Mr. E. D Smith: Mr. President, I am sure we have all been delighted and pleased with your practical address. There is one suggestion on which we should take action, that is in regard to the experiment station in the fruit district. It was brought to my mind by the discussion that occurred to-day in regard to what is being done at the Central Experimental Farm at Ottawa. It was very interesting, indeed, to nurserymen to know what kind of fruits are hardy at Ottawa and the northern section of the Prov-

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ince, and it is no doubt equally interesting to apple growers in the northern sections of the Dominion; but for the great bulk of the fruit growers of Ontario, who produce almost all the fruit, tender fruits especially, the experiments conducted at Ottawa are necessarily of little use in regard to the varieties of fruits that are successfully grown there, so that it seems to me that we as an association ought to press strongly upon the Dominion Government the necessity of having a large experimental fruit farm in the fruit district of the Province of Ontario.

The SECRETARY: There is another point in the address which should not be passed over, I think, without being voted upon, and that was the recommendation that this association confer honorary life membership on the two now living constituent members of this association, viz., D. W. Beadle, Toronto, and A. M. Smith, St. Catharines—(Hear, hear)—and I would now move that we elect them to that position.

The motion was carried unanimously amid applause.

A. M. SMITH: I am sure I am very grateful for this action that has just been taken, and when I look back upon the early days of the association, and remember the trials and difficulties that we had in the beginning, and look around again at the present, and see the work that we have accomplished, it gives me still greater satisfaction to think that I have been even a humble instrument in forwarding this great industry, and I am sure as long as I live I shall ever take an interest in the work of the association, and I thank you very cordially for the vote giving me a life membership. (Applause.)

Mr. MORDEN (Welland): I attended those early meetings of the association, not the first one, however, and those names that have been given to-night of the early members are very familiar ones to me.

REPORT ON THE EXPORT OF TENDER FRUITS.

BY L. WOOLVERTON, GRIMSBY, ONT.

This object has been before the Ontario Fruit Growers' Association for some years past, and the writer, being secretary of this association and of the fruit experiment stations of Ontario, has been asked to act in this particular for the extension of our fruit markets. On referring the matter to the Minister of Agriculture for Ontario, he expressed his willingness to aid us in every way possible. The export of peaches, pears and grapes being more vital to Ontario than to any other Province, it was natural that our Province should now exert herself in her own interests, and carry to a successful issue the work so well begun in an experimental way by the Dominion.

Last year the writer was commissioned by the Hon. John Dryden to forward a few hundred cases of Ontario grown grapes to Manchester, to test the English market for our best varieties. The varieties selected were the Red Rogers. They were packed in five pound veneer baskets, four in a case. As reported in our Fruit Experiment Station report, they were received in Manchester with great suspicion, and at first no one would purchase them at any price, but by and by the costers bought them gingerly and began selling them on the streets. Then they came and paid double the price for the remainder of the stock, and our consignees, Messrs. B. W. Potter & Co., said that, if we could have continued the shipments regularly with each succeeding steamer, they could soon work up a trade for Canadian grapes at a probable paying price.

This season Mr. Dryden extended the experiment to include other fruits, and fitted up the "Trader" of the Manchester Line with a cold storage compartment especially adapted for carrying fruits; he also fitted up a refrigerator car, after Hanrahan's patent, for the especial purpose of carrying fruit in perfect condition from the point of shipment to the steamer.

The first Trader shipment made was chiefly Red Astracan and Duchess apples, and was forwarded on the 25th of August. The following fruit growers united in making up the shipment, at their own risk, viz.: L. Woolverton, A. H. Pettit, E. J. Woolverton, W. H. Nelles, C. W. Van Duzer and S. M. Culp. In order to secure the cold storage space of 1600 cubic feet, it was necessary for us to combine and agree to fill it every time the Trader sailed. The apples were graded to uniform sizes and packed in half

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bushel cases. They arrived in Manchester in fine condition which proves how complete a success Hanrahan's system of refrigeration is, for the Astracan ripens in ordinary conditions a few days after it is picked. Owing to the great crop of early apples in Great Britain, these perishable apples sold at 60 cents a case.

There were also some bushel cases of apples which sold for $1.40 each, and some Wilson cases with fillers which sold for 96 cents each. One Wilson case containing one hundred Hales peaches sold for $1.46.

The following is a summary of account sales of fruit export shipments, 1900.

FIRST SHIPMENT, "TRADER," AUGUST 25.

1	case peaches	6s.	$ 1 46
67	half-bushel cases of pears	4s.	65 26
413	" " apples	2s. 6d.	251 41
10	bushel cases apples	6s.	14 61
109	Wilson cases apples	4s.	106 17
			$438 91
	Expenses		290 01
	Net proceeds		$148 90

SECOND SHIPMENT, "COMMERCE," SEPTEMBER 15.

1	case tomatoes	$ 0 61
496	cases Bartlett pears, averaging 74c—$1.95	464 13
56	cases apples, averaging 97c—$1.25	62 82
5	cases peaches	13 39
A. H. P.:		
65	cases pears	59 13
25	cases apples	14 32
11	cases peaches	22 40
E. J. W.:		
118	cases pears	122 74
B. B.:		
110	cases pears	93 50
		$853 04
	Charges	365 39
	Net proceeds	$487 65

This shipment was in the nick of time for Bartlett pears, and gave most satisfactory returns. The "Commerce" was fitted up with an adaptation of Hanrahan's system, and the temperature kept within certain specified limits of temperature.

These were all sent at the risk of the growers.

THIRD SHIPMENT, "TRADER," OCTOBER 5.

757	cases pears	$718 69
44	cases apples	68 20
133	cases and crates grapes	104 77
32	cases peaches	24 00
		$915 66
	Charges	461 24
	Net proceeds	$454 42

The pears and apples in this shipment were sent forward at the expense of the growers, but since there was almost a certainty that grapes would not bring any profit, the growers could not reasonably be asked to risk them. The Department therefore purchased 133 cases and crates of grapes and assumed the risk of loss.

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FOURTH SHIPMENT, "TRADER," NOVEMBER 20.

		£	s.	d.
4	Cochrane cases apples	1	10	
17	Wilson cases apples	3	8	
366	Bushel cases apples	101	2	2
296	half bushel cases Keiffer pears	23	9	6
74	" " Quinces	4	19	
64	" " Grapes	13	14	
164	" " Grapes	5	4	6
		153	7	2
	Charges	107		3
	Net proceeds	46	6	11

This last sailing of the Trader was too late in the season, and the risk was too great to ask shippers to assume upon grapes and pears. Therefore, the Department undertook these fruits, and sent forward 266 cases of Keiffer pears and 228 cases of grapes, upon which latter loss is almost certain until the fruit becomes better known in the British markets. Unfortunately the temperature at Montreal was very low about the 18th of October, at the time of loading and, in the transfer from car to steamer, the grapes and peaches were much damaged by frost. On this account their sale was for a much lower price than it would be otherwise, and the Department had therefore, to lose not only the cost of the fruit and cases, but also a portion of the freight.

The following letter is from Mr. P. Byrne, Government Agent at Liverpool, on this shipment:

"I duly received your letter of the 8th ult. with reference to the fruit shipments. It is certainly very disappointing that the grapes have sold so poorly, but I believe they will eventually do reasonably well, if they can be delivered in good order.

The public here are slow to take up with anything new, but a good step has been taken in impressing them favorably with our grapes. I have had three exhibits of them in Liverpool and a great many people have tasted them and pronounced them excellent. But the important thing is to have them delivered in good condition, and to this end quicker transit seems essential, if not indispensable.

The last shipment by the "Trader," which left Quebec on the 19th November, was discharged on the dock at Manchester on the afternoon of the 5th inst. I inspected it immediately on being landed and found the apples, pears and quinces all sound. But the grapes, though fairly dry and sound generally, were in several instances wet and decayed. Since then I learn that they rapidly deteriorated after being landed and I fear a heavy loss on them is inevitable. The cold storage arrangements seem to have been all right, but the fruit must have been too long picked at the time of shipment."

If we could have the "Trader" with its excellent system of refrigeration sail on the 15th of August, 15th of September and the 15th of October, it could be filled with fruits just in their prime, first with Astracan and Duchess apples, second with Bartlett pears and peaches, and third with fancy Duchess and Anjou pears and Rogers grapes and that without risk of any loss.

The total proceeds of the first shipment was $438.91, a satisfactory amount were it not or the unusually heavy charges which are advanced this season about double the usual amount owing to the South African war. The following is a detailed list of charges:—Freight paid Manchester liners, $227.51; Manchester ship canal tolls and wharfage, $13.96; cartage and porterage at docks and re-delivering, $5 74; sampling and taring and clearing, $2.48; marine insurance, $2.52; market porterage, $11.86; brokerage at 5 per cent., $21.94; cable, $3.90, amounting in all to $290.01. This left only $148.90 net, or a little less than we could have got for the same goods at home. However, we had the satisfaction of having our fruit reach the market in the very best condition, and of establishing a reputation for our fruit that will be worth millions to our fruit growers in the immediate future.

The following extracts from letters from the consignees, Messrs. B. W. Potter & Co., Manchester, regarding this shipment will be of general interest:

Manchester, 12th Sept., 1900.

SIR,—The shipment ex Trader landed in capital condition and, if it had not been an extraordinary year, you would have had a very good return; as it is we have been getting good prices compared to English fruit which has been almost given away. We have not completed sales yet, but hope to wire you directly with the next result. Now we have pleasure to report

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on packing. Apples will do very well indeed with wax paper *only*, no moss or shavings, and packed only in bushel cases—half bushel cases will not pay you so well. Pears in paper shavings and packed in halves are best. They took much better than the apples, and we could have disposed of more. The case of peaches arrived in splendid condition, but would not keep, and was sold at once, realizing $1.46. Buyers do not like packages which they have to return. Some of the cases were packed too tightly and the fruit accordingly bruised. This is a mistake which, we think, might be avoided.

The marking on the cases leaves room for improvement. Everything is done in such a hurry in our market that it is a distinct disadvantage having to examine a case carefu'ly to find out the variety of grade and contents. We would suggest that you use the plain end of the case for mark, variety and grade, simply putting in bold type say

L.W.	KING
87	A No. 1

leaving off all other lettering. You might use different colored ink for pears and apples.

Manchester, 17th Sept., 1900.

SIR,—We cabled you to-day as follows : "Thirty-six Net. pears 97c, Bushels $1.46, halves 61c, Wilsons 97c, average gross proceeds," which we meant you to understand as thirty-six pounds net balance (the pears bringing 97c, bushel boxes apples $1.46, half bushel apples 61c, and Wilson patent cases 97c (with box $1.22) average price. It is a very disappointing return we must admit, but considering the state of the market the price is a good one. We send you the "Shipping Gazette" of the 15th inst., and draw your attention to page 10, from which you will see American apples have been fetching from $1.22 to $2.44 per barrel.

The writer was present whilst the steamer "Trader" unloaded, and entered the cold chamber, finding it *perfectly dry*, and he considers that the fruit *could not have been carried better, the new arrangement of the brine pipes being a splendid improvement.*

In nine years out of ten the return for the fruit would have been splendid, and it is most unfortunate that you should have fallen across the tenth year.

Your own fruit, on the whole, carried best, and we think you must have picked it in better condition, especially the pears."

The second shipment was made by the steamer "Commerce," leaving Montreal September 15th, just in the nick of time for Bartlett pears, but too early for Elberta peaches. The fruit was kept in cold storage while the carload was being made up, and carried by the Hanrahan automatic refrigerator car to Montreal, and thence transferred to the cold storage chamber of the "Commerce," which was fitted up with the ordinary cold storage chamber, under the direction of Prof. J. W. Robertson, Dairy Commissioner. There were in all 882 packages, and the total net returns were $487.67.

Mr. Peter Byrne, Ontario Government Agent at Liverpool, writes concerning this shipment, October 5th, 1900.

SIR,—The Hon. John Dryden having informed me that you would like to hear from me regarding the condition of your shipment of fruit on the S.S. "Commerce", I am glad to inform you that I found it very good indeed. The fruit was very cold and some of it very "sweaty" when opened, but otherwise it was all right, every case inspected being sound."

The Elberta peaches were rather green and immature looking, and consequently less attractive than the "Crawfords" sent by Messrs. Pettit & Son. Some of these had probably been a little too ripe when picked, as a good many of them were in various stages of decay when opened. Whether the wool used in packing had anything to do with it I could not say. But the majority of Crawfords were in perfect condition and have been much admired for their beautiful and attractive color.

Your case of tomatoes turned out sound but very tender in the skin, and soft. It is well you did not send any considerable quantity, as the market is glutted with "foreigners."

The pears sent by E. J. W. all turned out well. Those shipped by D. J. McK. were to a considerable extent damaged having perhaps been packed over ripe. Messrs. Pettit & Son's lot (two grades) were in about the same condition, a good many in some of the cases being bad, and others being all right. Part were packed with wool and paper and part with paper and shavings. I am inclined to think the wool packing is of doubtful benefit.

I find that some experienced fruit dealers here have no fault to find with the present modes of packing and would suggest no alteration whatever.

Mr. Potter secured the temporary use of a fine show window in Manchester for a display of the fruit ; and I have done the same here. I brought from Manchester a Wilson case with carefully selected of pears, apples and peaches, but, finding these were too few to be effective, I got four half cases from Mr. Shuttleworth in Liverpool, who is the consignee of the other shipment ex "Commerce," and with their aid I got a good and effective exhibit for the show window of the C. P. R. offices. It is attracting an immense deal of attention. I invited all the

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Press of the city to come and inspect and taste the peaches which, being a great novelty here, form the most attractive part of the display. The great mass of people here actually think that they are grown under glass and are astonished, if not incredulous, when they learn that they grow in the open like pears, apples, etc.

One of the wholesale salesmen in Manchester entrusted with the disposal of your fruit, told me that he had sold 20 cases of pears in an hour and every one of them was opened and found in prime condition. The price was $1.22 per half bushel case.

This is a very abundant fruit year in this country and glutted markets have kept the prices low. I will send you papers containing press notices of our exhibit. If you are sending any grapes with the next shipment, I intend to make a public display of them also and will urge Potter to do the same in Manchester.

The following letter from Messrs. B. W. Potter & Co., the consignees, is also of interest. It is dated Manchester, October, 1900.

SIR,—The major portion of your "Commerce" shipment has been sold, the Bartlett pears fetching from 97c. to $1.22 a case, with some wasty one 49c., and a few absolutely worthless. These latter we think must have been against the brine pipes and the temperature has been too cold.

Tomatoes will not pay for sending; they are too cheap here. Your box fetched 61c. The sixteen cases of peaches have sold for $1.46 to $3.17 a case, but a very large proportion of the fruit was bad. Details of all marks to follow. The bushel cases of pears are too large and don't sell well.

Peat moss will not do for packing. It does not keep the fruit well and certainly looks badly when cases are opened. Keep to the fine shavings and paper. We enclose sample of paper the Californian pears are wrapped in and they carry splendidly. The wax paper also does well and is good looking.

The peaches seem best packed without wadding. The Elbertas are soundest, but the Crawfords take much better; they are so showy. Some fruit has been picked too green to ripen

The apples of course came splendidly. Please send in future full details of marks, grade, variety and size of package. We had great difficulty in sorting out on quay. A good consignment arriving a couple of weeks before Xmas would do splendidly we feel sure.

Under date of October 10th, Messrs. Potter & Co. write.

SIR,—"We cabled you to-day, 'Net 105.' This is the approximate net proceeds of the 382 packages landed. The charges have not all come in yet, but we do not think the actual result will vary much from this figure.

We are sorry the result does not equal the 97c. You wanted to make the shipment pay, but you have certainly made more by this fruit than any other people in the market. More than this, you have given the fruit a good standing and the public like it and will ask for it again, so that the result cannot be measured merely by the cash return."

The following is from the *Journal of Commerce*, Liverpool, dated October 8, 1900:

"The enterprise of our Canadian cousins has for many years been a factor of considerable importance in regard to the trade of this country, for Canada has year by year been sending supplies of various kinds in ever-increasing quantities. For some years past attempts have been made by Canadian fruit growers to find a market for their surplus produce on this side of the Atlantic, their efforts meeting with varying success, but at last there is reasons to think the time has come when Canadian grown fruit will compete on exceedingly favorable terms with the home grown article, and this not only in the hardier class, but also in fruits of the most delicate description. When the earlier shipments of fruit were made a few years ago the result was almost sufficient to give the project a death-blow, for the conditions under which the produce was carried were not at all such as to improve the fruit during its passage across the Atlantic. The butter man of Montreal required a temperature of twenty-two degrees for his produce, the beef exporter wanted twenty-eight degrees, the fruit could not do with anything under thirty-six degrees nor much above forty degrees. Consequently, when all these classes of goods were placed in the same cold chamber on board the steamer, some portion of the consignments had to suffer, and the fruit fared the worst of the lot, for when it was opened on this side and exposed to the warm air of this country, the tissues of the fruit burst and it wasted away within twenty-four hours, the experiment thus ending in failure. The matter was reported to the Canadian authorities, and after some further experiments, through the efforts of the Hon. Sydney Fisher, the Dominion Minister of Agriculture, shipments were made in steamers which provided the temperature requisite for the proper carrying of fruit, the produce being carried in a special chamber cooled by the Linde system. The improvements have, of course, been gradual, and success came very slowly, but it is thought now that the general principles under which fruit can be carried to the best advantage are pretty well known, and that only in minor details can the system be improved. One of the important points connected with the carriage of this class of produce is the necessity for keeping it at a temperature which, while sufficiently low, is not

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allowed to vary to any extent. Considerable difficulty has been experienced on this point, for the best-meaning engineer may temporarily neglect this portion of his charge, and the mischief is done, in most cases beyond repair. A thermograph or self-registering thermometer, is now provided for each chamber fitted for the carriage of fruit, and this provided a record of the actual changes of temperature during the voyage: thus it can be seen at a glance whether the fruit has been carried under proper conditions or not.

A recent shipment of fruit by the Manchester Commerce arrived in this country in the pink of condition, and samples have for the past week been exhibited at the office of Canadian Pacific Railway, James st. There passers-by were astonished to read that all the fruit exhibited, which included some of the finest peaches imaginable, was grown in the open air. One fancies the Canadian climate to be more or less like a severe Christmas in this country, but during the summer season the land is a veritable garden, where flowers and fruit which it is only possible to produce in hothouses in this country are to be found in every garden. The fruit sent by the Manchester Commerce is grown at Grimsby, Niagara District, Ontario, a place famous for its orchards and vineyards; and here every description of fruit, including the finest Williams and other varieties of pears, and many kinds of peaches, are grown in the open air. Those on view at the offices of the C. P. R. in James street were a continual source of attraction to passers-by, and some were so carried away by the exceptional appearance of the fruit as to be induced to enter and attempt to purchase what were only exhibited as samples. In Canada the fruit is carefully picked, the peaches when almost ripe the pears and apples somewhat earlier, and as carefully packed, being forwarded by rail to the port of shipment in refrigerator cars. These cars are specially fitted for the purpose, and, being properly attended to, the fruit is carried through to the steamer in excellent condition. Of late, owing to the splendid arrangements made on most of the newer boats crossing the Atlantic, the carriage to the this country has been perfect satisfactory, and the result is that the Canadian growers have been able to put their fruit in the English market in perfect condition. It has been well in demand wherever offered, and has been sold at prices which equal, when they do not exceed those paid for the more hardy, but less juicy and delicious, fruit from California. Orders have already been received for large quantities of Canadian fruit, which is only being shipped. This includes some consignments of Canadain grapes, which will be put on the market in the course of next two or three weeks."

Shipment No. 3 was by the steamer "Trader" again, sailing October, 5th, but this was too late a date for peaches or Bartlett pears, both of which were in season for the previous shipment of September 15th. Added to this the ice at the Grimsby storage gave out, and the weather came exceedingly warm while we were packing. Under these unfavorable conditions we thought best to send forward only about sixty cases of peaches, which arrived in Manchester quite over ripe, and the same was the case with the few Bartlett pears, but the principal part of the shipment consisted of fall apples, such as Ribston, Fall Pippin, Blenheim and King, which sold at from $1.50 to $1.75 per bushel box; and of such pears as Duchess, Louise, and Sheldon which also arrived in fine condition and sold well.

There were also some red and black Rogers grapes, about two tons, sent forward in the storage chamber These arrived in fine condition, but, as usual, failed to bring paying prices.

Mr. P. Byrne, Ontario Government Agent, writes to the Department of Agriculture at Toronto, on the 24th of October, as follows:

"The grapes, speaking generally, were in very good condition. An occasional sample was slightly wet or mouldy, but on the whole, they looked attractive and sound.

The pears were generally good also; I assisted in preparing and arranging an exhibit of the fruit at Manchester and brought with me selected samples for a display in Liverpool similar to the one which was so successful in connection with the shipment brought by the Manchester Commerce. The samples I am showing consist of a tray of 25 very fine Elberta peaches, also two cases of red and black Rogers grapes, two cases of pears and one case of apples. They make a very handsome and affective disp'ay and consitute a most valuable object lesson as to what our Province is capable of producing. I sent notices to the press annoucing the exhibit, and the consequence is continuous crowds as before inspecting and admiring the fruit."

Messrs. B. W. Potter & Co., the consignees, write on the 27th of October, as follows concerning this third shipment:

"We have now the pleasure to report upon shipment per Manchester Trader of grapes, pears, apples and peaches,. The latter were nearly all spoiled, and we should say that they were packed to ripe. Besides this we see the Wilson cases are not ventilated at all. Kindly examine them and you will see that this is correct. It must have a serious affect upon the fruit.

The Duchess pears have carried splendidly and taken much the best with buyers, prices varying from 75c to $1.40 per case. The Louise turned out very wasty, but the White Doyenne

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and Anjou were mostly sound. The Bartletts were almost wholly rotten and we should judge had been picked at the wrong time, or stood before being placed in store. The prices will give you a good idea of the public taste.

All the apples were in excellent condition, the Ribstons fetching the best price, $1.71; with Blenheims and Kings, $1.58, and Fall Pippins, $1.46. We could have disposed of any quantity of these fruits.

The grapes arrived in very much better condition than last year, there being hardly a bad case. We think the boxes with four baskets of five pounds each is the better package, and, as we have said before, the black Rogers will always sell the best. With a little perseverance these grapes should be a success, but we want a steady supply for the few weeks the season lasts."

Whether our grapes will ever become popular enough in England to make it profitable to export them, seems a question. At first the dealers would not buy them at all, and our consignees had to persuade the costers to take them out on the streets for sale, but by and bye they commanded a small price, which is slowly creeping upwards. But, even yet, the price is not equal to the value of these grapes in Ottawa or Montreal. A report of the sale of 3,360 four pound baskets of red and black Rogers carried over in a ventilated compartment, and sold in Manchester the 23rd of October, shows that they sold at about five and six cents for a four-pound package, the beautiful little baskets with covers and wire handles, costing without the fruit about three cents each; the price, therefore, leaves only about one cent per pound for our very best Rogers grapes, which are worth from two to three cents a pound in our own vineyards

We would think from this shipment on the "Commerce" that we would never be able to export our grapes with profit. A shipment, however, of thirty-nine 50 lb. crates, each containing twelve little 4 lb. baskets of Rogers, either red or black, and ninety-four 20 lb. cases, each containing four 5 lb. baskets, as shown in our illustration, and forwarded October 5th in Mr. Dryden's compartment on the "Trader," to Messrs. B W. Potter & Co., Manchester, brought much more encouraging results, and our consignees write that, if we could continue regular shipments weekly, and not too many at one time, they think they could gradually work up the price to a paying basis.

The following is our account sales of grapes in the third shipment. The varieties were mostly Lindley and Wilder, and were grown by N. Keep, Winona, J. A. Pettit and L Woolverton, Grimsby.

7 cases at	1/10	$ 3 12	
54 "	2/	26 30	
11 "	2/3	6 02	
9 "	3/3	7 12	
13 "	3/3	10 29	
24 crates	5/	29 22	
13 "	5/6	17 41	
2 "	10/	4 87	
			$104 35

Charges

Freight	72 10	
Manchester Canal tolls and quay charges	3 33	
Carriage, porterage, warehousing, sampling and taring, clearing and forwarding, warehouse rent, fire insurance	10 00	
Brokerage at 5 per cent	5 21	
		90 64
		$13 71

The following is a general summary of gross sales and charges for the whole cargo, the latter of which are altogether too high and must be reduced in future, if the trade is to prosper:—

757 cases pears	$718 69	
41 " apples	68 30	
133 " and crates grapes	104 36	
52 " peaches	24 77	
		$916 12

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CHARGES.

Freight	351 73	
Manchester Canal tolls, quay charges	35 50	
Cartage and porterage at docks and warehousing	12 97	
Clearing and forwarding, sampling and taring	3 81	
Warehouse rent	5 66	
Fire insurance, Marine	7 51	
Porterage at market	11 51	
Printing	6 02	
Brokerage at 5 per cent	45 80	
Cable	73	
		461 24
		$454 88

The graded apples sold remarkably well, Ribston Pippins bringing $1.75, King and Blenheims $1.58, and Fall Pippins $1.46.

The pears also did splendidly, except Bartletts, which were a little out of season for the shipment. Duchess sold at from 97c to $1.40, Bartlett at from 36c to $1 22, Louise Bonne at from 24c to 91c, White Doyenne at from 85c to 97c, Anjou at from 73c to $1.15, Howell at 85c, Sheldon at from 61c to 85c, Beurre Clairgeau at from 73c to 85c, Lawrence at 97c, Peerless at from 85c to $1.09.

The peaches were also past season on October 5th, and had to be kept in ice storage a couple of weeks before sailing, consequently they did not carry as well as those sent in the previous shipment. The varieties were Late Crawford, Smock, Willett, Elberta, and they did not pay freight charges. We have confidence, however, in peaches that, if picked firm and sent forward immediately, we can land them in perfect condition, and realize long prices; and the same is true with regard to our tender Bartlett pears.

CONCLUSIONS. On the whole we conclude from this season's experience that, with certain limits of temperature guaranteed to us on shipboard as has been arranged for us this season by the Hon. Sidney Fisher, and with Hanrahan's system of circulation of air we may export pears, summer apples, and even peaches in perfect condition and with perfect confidence. We have already established a fine reputation for our goods in Manchester and, if this trade can be pushed forward, there is no question that a new day of better things will dawn for Canadian fruit growers.

Our pears are especially admired and appreciated in England and we may send forward as many as we like if only properly graded and packed. In evidence of this we quote the following from the "Fruit Grower," of London, England, under date October 4th :—

"The samples of pears were unusually large and fine. The Williams were grand and it is clear that no competitor on the market from any outside centre can touch them, for as far as quality, size, flavor and color are concerned they are as perfect as a market Williams can be. The other varieties are also of prime quality. It is thus evident that at least the whole export business has been put upon a proper basis and that Canadian growers and shippers may rest satisfied with the situation as far as methods of transit are concerned."

And again under date of October 11th :—

"It is worth noting that best pears have met a fairly good sale through the week and that the supplies have, thanks to the Canadian shippers, been well up to the mark. The Canadian Williams (Bartlett) has attracted a good deal of attention in fruit trade circles. Some large specimens have been put on sale and as the skins of the fruit were clean and delicate they met a good reception from buyers in the best fruit shops. We learn that a large quantity of pears are to come across and that in future years the competition in this branch of trade will be very keen. As a matter of fact the pear trade from October till February is excellent and good samples put upon our markets during the former months can always be depended upon to secure good prices. The one difficulty so far as Canada is concerned has been overcome. Now they are in a position to put their fruit on our markets in perfect condition and this is a consideration. So long as the fruit sent is large, of good quality and well graded it will pay. It has taken the colony time to master the initial difficulties that beset its path at the start and it is hoped now that it will be able to develop a profitable business with this country.

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The following extract is from the "Liverpool Mercury," in October:—

"Since mechanical refrigeration was inaugurated on steamers running from Canada to British ports in 1897, many improvements have been made in the grading and packing of fruit until to-day Canadian grown peaches, pears and apples can be landed in this country and placed on the market in as perfect condition as if picked a day or two ago instead of a month. This has been illustrated by a consignment recently received in Manchester. The Hon. John Dryden, Minister of Agriculture for the province of Ontario, is co-operating with the growers in the matter and the Canadian Government are now providing for each chamber fitted for the carriage of fruit, a thermograph, or self-registering thermometer, which shows whether the fruit has been carried under proper conditions or not."

Messrs. W. B. Potter & Co., writing on the 3rd of November regarding the third shipment, say :—

"The grapes have not realized much but the apples and pears should satisfy you, we think. It is unfortunate we had nothing from you by the 'Manchester City' in this week, as prices have been still better and all our friends were anxious for further supplies. The quantity of French pears on the market was much smaller during the week and this helped prices. You will find it to the advantage of all concerned to send regular shipments and not one occasionally.

The Duchess pears have been quite the most successful of any variety. They have carried exceedingly well and stood up afterwards. This is a great advantage and gives buyers confidence to take a quantity. We do not know whether the Bartletts could be picked at the right moment to keep better, but it certainly is their weak point. You will notice the number spoiled this time.

Would it be possible to send a consignment of fruit in cases to land here about ten days before Xmas? We are confident good prices would be realized. The cases would be handy for presents."

Now since the Province of Ontario is more deeply interested than other provinces, in the development of this fruit export trade, we think our Association should urge upon our Provincial Government the great importance of vigorously prosecuting this enterprise until we see public confidence in it established; until the days of glutted home markets for fruit are passed away forever, at least for fruits of the higher grades, and until the prices of these goods at home are established by their advanced export value, instead of their being sacrificed as now on overloaded home markets. Why should our pears, that are worth from 75c. a basket for export, and our peaches that are worth from $1.00 to $1.50 for that purpose, be sold here at from 15 to 30 cents? Why, with such possibilities just within our reach should the thing be dropped, and our growers left to struggle along in an industry that, though once profitable, is now becoming unprofitable?

The Dominion Government has kindly opened the door for us, and the Provincial Government has begun to take an interest in us, let us now strongly petition our own province to help us still further to pursue this enterprise, and not to drop it until it is as firmly established as any of our industries.

I think the wisdom of the committee is needed to consider details, but, in general, I would move that we extend a vote of thanks first to the Minister of Agriculture for the Dominion for his work in providing cold storage on shipboard with guaranteed limits of temperature, and for carrying out our wishes regarding better storage of apples on shipboard; and to the Minister of Agriculture for Ontario for taking so much interest in the fruit industry of our province as to fit up the steamer "Trader" with Hanrahan's patent cold storage, and fitting up one car to connect with the same, and for the experimental shipments sent forward during 1900; at the same time expressing the hope that he will continue to interest himself in this work until it has been established on a trade basis.

I would urge that this trade be developed in all fruit centres by some scheme which would provide for the building of local storage houses at any fruit growing centre where there is a company of fruit growers who would agree to make up a car load each week for export, and meet the required conditions of the cold storage building; that a car be fitted up with Hanrahan's patent to run weekly between each cold storage and the shipboard, and that cold storage space on shipboard be always reserved to meet the requirements of such shippers.

Mr. Rice : Did you wrap the apples up in the Wilson case?

The Secretary : We did, but probably the cold air would work better if they were not wrapped, so long as the little compartments were properly filled.

A Delegate : What is the cost of the cases?

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The SECRETARY: This case has been costing 30 cents complete; I have a letter from the firm saying they expect to be able to furnish them next year for 20 cents. It is proposed to make them a little larger and to hold 144 apples. I think for peaches it is the best package we can adopt, whether it is the best for apples is another question. I bought a whole carload of that peat moss thinking it was the best material for packing and certainly it was the cheapest, but you see the reports upon it are not favourable. The excelsior seems to be more pleasing to the English buyers.

Mr. MCKINNON: Was the peat moss quite dry when it was used?

The SECRETARY: Some of it was and some of it was not perfectly dry.

Hon. JOHN DRYDEN: It was dirty.

The SECRETARY: It does not open up clean like the excelsior, and I think that is one of the objections to it.

Hon. Mr. DRYDEN: I heard some complaint against the packing of the boxes in the compartment; I think some attention must be paid in future to that.

The report was received with applause.

ADDRESS BY HON. JOHN DRYDEN.

MINISTER OF AGRICULTURE FOR ONTARIO.

I think I am warranted in saying that among all the branches of agriculture in this Province, there is none of greater interest to our people or of greater importance than the one which this Association represents. We have discovered in recent years that we can hold our ground in any country with our exhibit of fruit. We went to Chicago. Our friends to the south never expected much from Canada in this direction, and I think I am right in saying that we astonished them not only by the exhibit there presented but by the number of prizes which we won in open competition with them on that occasion. You have heard from Dr. Saunders the result of our exhibit in Paris. You have heard of the special prizes won there, and I believe that if we have a fairly good season in 1901 we shall do equally well in the exhibit we are attempting to put up in Buffalo. We have discovered also that it is not merely in a few places in the Province that we can grow fruit. Some of us used to think it was so. I had my eyes opened some years ago when I was a member of what was called the Agricultural Commission, and when we discovered that all along these lakes, covering the major portion of our territory in the Province of Ontario, we had a splendid fruit district. But then as we have come along during these years we have had a good many things to learn. I am speaking now not of the experts that I see here before me, but I am speaking of the fruit growers generally, because our farmers all over the country are more or less fruit growers. We have had to learn, shall I say, the impossibility of handling the fruit tree as you would handle the forest tree. I know farmers who seemed to think that if they planted the fruit tree and got it started it would develop for itself, and not only so but that on the same ground they could produce a continuous crop year after year, and all that they got out of the tree was so much extra. Now, all that has passed away, and I apprehend that there are not very many men in the country now who do not understand that that is practically an impossibility—that you cannot take out of the soil what is necessary to produce good apples in an orchard and try to take out a crop every year, and keep at that without giving back to the soil something of what you have taken out, without something coming to a dead failure. I have seen, and you have seen, instances of just such failure as that. Then we have had to learn the necessity of paying constant and continued attention to the fruit tree from the beginning—attention so far as pruning is concerned, latterly attention as far as spraying is concerned. I remember a few years ago a great many of our farmers thought that some of us were providing ways and means to induce them to spend their money over some new fad when we suggested that it was necessary, if they would do the best for themselves, that they should commence to spray their trees. Now we have got past that stage, and all our people are practically admitting

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now that if they will do the best for themselves they must attend to these things. Then we have discovered that fruits suitable for one section of the country may not be equally suitable for another section, and in order to help us in that matter, the Government has established those experimental stations of which you have heard We have 10 of them now. We have not reaped much result as yet; no one expected we should; but those who come after, who years hence will look at the record that is made, will I think have something which may be tolerably certain, indicating what will suit best for the particular district which these experimental stations represent. Then another thing we have learned is that we are being attacked year after year by new enemies which are making their appearance, and those enemies in the way of insect pests must be fought intelligently and unitedly. It is very little use for me or for one or two of you gentlemen to try to fight these pests with everybody else paying no attention to them, because they don't stop in the orchard where they start. They come over to see you as well, and therefore it becomes necessary that we should present an unbroken front if we are to the best for ourselves in this regard. Now, in reference to these pests you need law. You gentlemen have not hesitated to ask me as head of the Department of Agriculture to give you law. Will you let me suggest that I think at the present day there are some of us who place too much importance on the fact that you have law. I have seen temperance reformers and other kinds of reformers who seem to have one single idea, and that was, "Let us get some law on the Statute book, and then we can go home and go to sleep quietly, everything will be all right." (Laughter.) Now, law is necessary, but I point out to you that law is not all; that law is only enforced when it has back of it a public opinion; and that if you work to put a law on the statute book and your people are not in accord with it, and they resent it, then I undertake to say to you that your law is of very little use. When a man comes to me and says, "All I want is law; give me a statute that I can read once in a while, and I will be content," that man does not understand the situation. Now, you cannot drive people generally, and you cannot drive farmers especially. (Hear, hear and laughter.) I do not know a worse body of human beings anywhere in the world to undertake to drive or force to go in a certain direction than the people we call farmers in this country. They live in their isolation and in their independence on their farms, they whistle when they like, they yell when they like, they run when they like, they are not under control like our city brethren. I would be a very strange thing to see me start down Yonge Street on a full run; everybody would wonder what would happen, and I would have a policeman after me; but you gentlemen on your farms are used to this sort of independence, and you do not like criticism; you resent it more than anybody else. When I was down in the Maritime Provinces we were talking about swine, and I suggested that perhaps some of them had undertaken to drive a herd of swine into a pea-field in order that they might be fed, and because they were just a little bit anxious to hurry them through, there arose a little commotion and they whirled around and, instead of going the right way, they went the wrong way, and the chances are they did some injury to your limbs. Now, if you could have pulled a few vines through below the gate and let them get a sight of it and a scent of it, and let them take the trouble to reach through and get some, you would have coaxed them through without any trouble. I am not going to say that men are like swine—(laughter)—but there is some little resemblance. Let a farmer get a scent of the advantage that will come to him by any certain course and he will walk in himself. When I started the travelling dairy, which had for its intention two things—the education of our farmers and our farmers' wives in their homes as to the manufacture of butter, and the increased interest which we expected would come because of the agitation which the travelling dairy would bring to the people, which would finally lead them to the place we wanted them—it was suggested to me that in that we were leading them in the wrong direction, that what was wanted was that our farmers should club together in a factory. My answer was, "This is the road to the factory." The first point was to have the farmer's wife see that she secured an advantage by producing a better article at home. The very next step is that they will get together and see that if they club together in a factory they will get a still further advantage, and the direct result of it was just that, and there never was a time in the history of our country when our factories increased so much as they did just immediately after the education given by the travelling dairy. So you see if you just show the way, even if there is

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a gate there that they have to unhinge, they will get it off and they will follow you; but if you undertake to say, "I will make you go, and I will take the lash and drive you," you will never get them at all. Now, that is perfectly true, I think, so that while some law is necessary, law is not enough of itself, and we must form public opinion as to the necessity of the law. Now, one of the worst insect pests you have ever had in this country is this San José scale, of which mention has been made here to-night. Being at the head of this Department, I was compelled to study in connection with it, and I think possibly I know more about it, and I think I feel stronger about it, than most of you do. I shall not live ten years longer—I shall not live five longer probably—before I find those people who were resenting, shall I say, our compulsion of law, I shall hear them saying, "He was right, and I was wrong."

A VOICE: They are saying it to-day.

HON. JOHN DRYDEN: I do not take back one single thing that I suggested in connection with that scale. I believe that it is a terrible pest, and I believe that it will spread and spread unless we get something more than we have had yet, until it will do incalculable injury to this country. These reporters know that for a year or so I kept them quiet, and said, "Do not say anything about the scale, do not get them in the reports for fear the report will get abroad and our English friends will say, 'They have got the scale in Canada and we will not let them come in.'" That is the one thing that troubled me more than anything else. I said, "It is sensational, but you can wait a while," and they did, and they acted like gentlemen, and had nothing to say about it. But, of course, it is now an open secret, and we cannot hide it. Now, I took rather a bold stand. I undertook to spend a lot of the public money, and the thought was that by spending that money, $100,000, it might be, we would quite stamp it out. I tell you I should be the proudest man in the country to day if I had succeeded in stamping it out with even twice that sum. (Hear, hear!) But of course our Legislature is divided into parties, and you cannot hinder partisans from taking advantage even of the course you take in a matter like this, and so we had all sorts of criticisms,—people standing up in the Legislature and saying, "The Minister of Agriculture does not know what he is talking about, he is afraid of a little scale; he cannot see it; you can hardly find it with a microscope; it has been here for years, it has not done any harm, it is not likely to do any harm," and all that kind of thing. And the result was that the public opinion in the part of the country where we were laboring rose so strong that you know what happened—deputation after deputation came down to the Government with the complaint that they did, because their property was being destroyed, and said, "This must stop." We did not stop it until we discovered that the scale was perhaps spreading faster than our inspectors were, and found it still beyond and still beyond and still beyond. I said to my inspectors, "Where is the outside limit of this? Find out for me now the next three months where the outside limit is till I know where I stand;" and so we put on more men and tried to circle it round, and I found in that time in that one district it would probably cost $300,000 at the rate we were going, and even then I would not know that I had it stamped out. The Legislature would not vote that money with public opinion as it was, and the result was we had to drop it, reluctantly drop it, and where the scale now is it is likely to exist for some time. The only thing now that we could suggest was we should try to keep it in the section where it then existed, that is to say, do what we could to prevent it spreading. It is fair for me to say, however, that the money we voted and that we spent was not all lost. Would you believe me if I were to say that we absolutely destroyed the scale in at least one hundred places in this country? Now, the greatest danger so far as the scale is concerned is that it gets into the nurseries and from the nurseries it is transported into the different portions of the Province and planted here and there, and you see how quickly in that way it will spread over the whole country. Now, if we could keep it out of the nurseries, at all events, prevent nurseries from spreading it about the country, we may hold it where we have it to-day, and undertake to check it as best we can by the sort of treatment which we have recommended. I must say that our chief nurserymen have stood at the back of the Department in a noble way. I have had the greatest amount of encouragement and help from our chief nurserymen, but there are some small nurserymen who do just as I have said a little while ago, and who say, "You want to compel us to fumigate our stock; we do not believe there is anything in your fumigation; it is a great humbug and a great cost and a great

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hindrance to us in our work, and therefore we do not want to do it." Now I have insisted as head of the Department that the law in that matter shall be carried out. I believe I will be backed up by the highest nurserymen and by this association, to get public opinion roused sufficiently so that any of those people who think they are imposed upon will cease their objection and will heartily carry out the law so far as they are concerned. Now the effort to keep it in check is by treatment. My thought is this, that no treatment yet in any country has absolutely killed the scale. The gentlemen who are making the pumps have provided us with machinery which is pretty near perfection, I fancy, for the purpose that we want, and we will probably be able to use these; but the difficulty is in the actual performance itself. A man must be mighty careful if he can cover every inch on a tree, and if he leaves one square inch, if he leaves one scale there, the little creature is so productive that it will set going a few more broods in a year and away you go again. You see that is the difficulty. However, I do not see any other way that we can meet the difficulty than continue our operations in that way. I shall be very glad before the association adjourns to hear what you gentlemen have to say in reference to it. Now, let me say that the possibilities of this industry in this country, in this Province of ours, are simply immense. There is not a country that could not in a few years double its product. (Hear, Hear!) You heard what Dr. Saunders told us this afternoon, that there is room in the Old Land for ten times the amount that we are producing in this country. But then you say, "That market is so far away, thousands of miles away across the sea;" and I want to say right here that the individual producer is absolutely helpless under these circumstances, and I defy any of you gentlemen to undertake to work out your own salvation in reference to this transportation unless you get help. It cannot be done. (Applause). So that this is one of those positions in which it becomes necessary for the gentlemen who are in control in our country to come to our rescue and relief. There is need of better transportation facilities. The product is perishable, and it must be handled at once at the right time, and so it becomes necessary that special provisions should be made for getting it across this great ocean. Now the only thing we have discovered yet is this cold storage about which so much has been said, and you gentlemen who are fruit growers ought to understand two things: First its importance in connection with this industry. One of my colleagues will be here to-morrow and talk to you a little more about this cold storage and its principles, but its importance cannot be over estimated. You cannot get on, you cannot make progress, you cannot double up your product as you ought to do in this country without this cold storage, therefore it is one of the important things that we have got to deal with. Then secondly you want to understand its principles. Now, we think there are two principles in connection with cold storage. Possibly the Ontario Government has done a little by conference with the Dominion Government in this regard, because the cold storage compartment that we have placed upon the Steamship Trader has an additional principle—the necessity of a lower temperature than would ordinarily be found on the ship, but in addition to that there should be a constant circulation of air and not an absolute stagnation. Let me just in a word explain what I mean. You all known that if the air is warmer here than it is outside, and you let down that window at the top, cold air will come in at the top of the window and come right down to the floor and begin to move off in the room. You can try that any time and find that is the case. Now we use that principle, and we put the pipes in such a place in the compartment as to start the air going down, which of course begins a circulation of warm air taking its place, and therefore the air being circulated that way coming from the fruit, bringing away the dampness, the gases and so on, it is brought around in contact with the refrigerator pipe again and purified and kept dry. The moisture is taken on the pipes, just the same as the moisture would be taken on a glass of cold water on a hot summer day. Now, you heard what Mr. Woolverton said about the two shipments, but possibly you would not have observed it as closely as I did, because I am watching the effect of this principle. On the Manchester Commerce, where this Hanrahan system of circulation was not as perfect as it was on the Trader, you heard the report, which read, "A good deal of the fruit was cold and sweaty," whereas the report regarding the Trader said, "The fruit came out of it in a perfectly dry condition." That is exactly what I would expect; and if any one of you gentlemen have a cold storage plant or a refrigerator of any kind on your premises where everything is all damp and moist all the time, your refrigerator is not working right and

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you had better send for Mr. Hanrahan or somebody else to put it in order. We have had two or three of these refrigerator systems in connection with our institutions this very summer put in order, and the change is marvellous. At the Parliament Buildings we have one of those paper wind-mills that the children use, showing the circulating system, and you would be surprised to see the circulation buzzing around at a great rate as though there was a wind storm. That is the principle we should carry out if we are going to convey the fruit across the ocean in a proper condition. We have labored under a great many difficulties with our experiments this season, because we only had one what we considered proper compartment. We had absolute control of the one Mr. Woolverton has been speaking about, but the difficulty that we have experienced is that the fruit required to be held too long before we started. Now, if you are going to do your best, so far as cold storage is concerned, you must understand this, that you have got to have a cold storage building at the beginning, and you must not let your fruit, which is to be shipped to the old country, stand around the stations, or your own barns or buildings and bring it into the cold storage and expect it is going to go all right. If it has begun to decay no cold storage on earth will put in condition again; so that to think that cold storage will make unsound fruit sound is a mistake. The moment you take it from the vine or tree let it be placed in a building, and let it get out of that building into a cold storage car, and out of that into a cold storage compartment, and when it gets to the other side into another cold storage compartment, and keep it in if you are going to make a success of it. We have had considerable experience, and so far as I am personally concerned I confess to you I have had an exceedingly large amount of labor and anxiety all summer, and if I had known in the beginning that I was to meet with so many difficulties and obstacles I am afraid that none of the officers nor anybody else would have induced me to tackle it; but I understand that Prof. Robertson had declared that in his judgement grapes could not be taken over profitably nor peaches—they had never gone over successfully and the people did not seem to want them, and they would therefore drop it. On that account I said to Mr. Woolverton—of course he was pressing his case, as you have heard to night—"If that is the case I am willing to help you if I can." My theory is this: if you can hold your fruit in cold storage on the land you can hold it on the sea if you have the proper appliances. Now, I may be all wrong in that, but I do not believe I am. I think I am right, and therefore I say that somebody in this country ought to provide for the fruit growers of this country cold storage on the sea just as we have it on the land, and when you have got that, you have got something that is definite and certain, and so on that account we undertook it. A gentleman will ask, "Can our peaches be taken over?" I think our experience this year proves that peaches can be taken over in perfectly good condition. I think Dr. Saunders will bear me out in that. I want to say in Dr. Saunders' presence that we have not had a fair trial of it yet. We do not want cold storage just in one boat sailing every three weeks or four; we want cold storage boats leaving every week.—(hear, hear.)—so that when fruit is ready we know where to put it in. That was my intention. I intended to ask that we should be allowed to partition off a part of the cold storage compartments in each of those ships under the control of the Dominion Government, so that we could put in a carload at all events and try it under this system where we had a circulation of air, because every system had failed to some extent in the past, and we thought we could succeed in that way. But I found I could not succeed; I could not get the compartments. The compartment was in use; it was occupied. The steamship people fought me, and other people fought me whose names I need not mention here. I am not accustomed to be beat—(laughter); when I see my end to work for I am inclined to go ahead if I think I am right, and it does not make any difference where the opposition comes from. So I astonished Mr. Hanrahan by working out a scheme which enabled us to build at our own expense a compartment on the steamship Trader, and we have that compartment under our control, only we are trying to arrange with the steamship company to give us part of the money back again that it cost, and leave the compartment on the ship, which I have no doubt they will do. We have that, but it only comes once in three or four weeks, therefore peaches that ought to be sent at the right time are held here for two or three weeks, and as you heard from Mr. Woolverton, the ice gave out, and the cold storage up there, just in the heaviest season, was *nil*, and the peaches were starting to rot, and yet we were trying to make a success of it on this compartment that

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we built. Now you see these things must be remedied; we must not have cold storage simply half the distance and let the fruit spoil the other half. If you get your stuff on that Hanrahan car, let the railway keep it for a week until you get a steamship with a cold storage compartment; but we must have it continuous from beginning to end. That is not a big job, not a wonderful thing to do; it can be done, and if you fruit growers want it it will be done and must be done. (Hear, hear, and applause.) Then I think we have proved that we shall have in a few years in the old land an unlimited market for the grapes which you grow in this country. (Hear, hear.) They say the Englishman will not eat the grapes. Neither would I once. I had to learn to eat them. I didn't like them, but it didn't take me long, and it did not take most of our people long. I did not like tomatoes once; I like them now. Lots of things we have to learn. A boy takes a long time to learn to chew tobacco; but he gets there if he keeps at it—(laughter)—especially if he sees his neighbors continue in the same wicked practice. You will see Englishmen on the streets in London begin to bite these grapes and nibble at them, and some other fellow will say, "What is that fruit! I would like a taste of them"; and it won't be long before they will say "That is better than I thought it was." That is what will occur; that is what has occurred. Grapes can be sent, and they can be sold, and three years from now if we can get a continuous shipment, you would get a good market for our grapes. If I can do that, how much would it be worth to this Province? What would you say if I spent $2,000 or $3,000 a year for the next two or three years working this thing out? Would it pay? (Voices, "Yes.") A hundred time over, a thousand times, of course it would. (Hear, hear.) That is one of the legitimate objects, then, that those in authority ought to have before them; so that I think that we have proved at all events these two things: that our peaches and our grapes can be taken over there, and that both of them can be sold at a profit. The Government of Ontario has recognized the importance of all this, and we have sought to encourage the erection of cold storage buildings, and any of you gentlemen can get, up to a certain limit, an amount of money from the Ontario Government to help you work the cold storage plan. We think we have gone far enough in that direction. I don't believe in spoon-feeding; you must help yourselves. (Hear, hear.) We do a little to encourage you, but if you will not help yourselves you must give it up. Then we have built at the Government's expense this railway car, which will be here for your inspection, and anybody who looks into that car and understands the principle will say that is what it ought to be, a proper cold storage car. I guarantee that it will carry your goods in a safe condition.

Mr. Morden: Is it the Hanrahan system?

Hon. Mr. Dryden: Yes, it is the system that Sir Charles Tupper referred to in his address on cold storage. Those cars in South Africa referred to by him in that address were built on the Hanrahan system. Perhaps Sir Charles did not himself know that, but that is perfectly true all the same. We have also just built a sample for a farmers' cold storage plant—ice-house you would call it—at the Agricultural College, and any of you gentlemen who go there next summer will find it in operation and see how it works. Very few of you will be able to erect one like that; but what I am seeking for is that our people generally will become interested in it. I have asked my Farmers' Institute speakers to do what they can to study out the principles of cold storage and give it to the people as they go about the country, with a view of making an impression, because I can conceive of nothing that is more important at this juncture—more important for help, more important for prosperity in your business. So that I suggest to you that you study out the principles as we have brought them to you. Now our experimental shipments have proved just what Mr. Woolverton has said, that only the best of our fruits ought to be sent there, because as you understand that creates a proper impression and works out the market; the other way you work it down hill. That best fruit must be properly packed. Let us listen to what they say on the other side, even though we don't believe in their theories. The Englishman is a very off-hand kind of a fellow, he will have his way. Give him his way. He does not want this moss, he says it is dirty. Do not send it, that's all. Do not try to instruct him, for the first thing you know he will shy off and will not bother with it; but send your fruit properly packed in continuous shipments, and I guarantee now if you do not succeed you can blame John Dryden. You can succeed. I guarantee success along these lines, if you only pay attention to these

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things. I heard some friend here—excuse me for referring to him—speak about the fruit growers being one class in the community, and he did not like class legislation. Now, I don't want him to say anything more about that—(A voice—"No"); I'll tell you why. If I had adopted that theory I would never have done anything for you. The gentlemen who are interested in this fruit industry are possibly not interested in many other branches of agriculture. Certainly you are not very much interested in live stock, and I have been with the Live Stock Associations up at Guelph last week. They are another important class. I am helping them, and I am helping you; on what principle? Because you and they are interwoven with all our people and you cannot be separated, that is the reason (hear, hear) and there is not a banker, there is not a merchant, and there is not a laboring man that is not interested in your success and your prosperity (hear, hear). The banker makes his money because of the increase of the volume of trade, and when I am able to do anything that will help the fruit grower to produce more I am helping the banker, and he knows it, and I have got more friends among the bankers than I have in some places among the farmers. Some of those men down in Toronto have said—and the message has been brought to me; "There is a man up there in the Parliament buildings that is doing more than a dozen or two other politicians." Why? Because we are working them on these lines leading to practical results of increased production and better production. The banker is interested, the merchant is interested, because when you make a little more money and a little more profit you buy considerably more goods than you did before, and he makes a little money; and the laboring man knows when you are prosperous he always has something to do, and so it goes. And what I want to say is that although you belong to one class, and although you may not belong to my class, we are all tied up together, and whether we live in the east or the west, I am glad to say in these latter days we are bringing our east and west together and recognizing that we stand and fall together, for we are all Canadians and we cannot separate ourselves to any extent at all. Now I want to say just one thing and I will stop. Be careful and let this Association continue to be a live Association. (Hear, hear, and applause). I find some fault with these Associations, and they have thanked me for finding fault with them. I am not finding fault with yours; but do not let this Association ever be attacked by the yellows (laughter) or the scab, or the dry rot (laughter) or the scale, or the blight, none of these things. These terms are applicable; you appreciate what I say. Now I say that this association ought to be so alive that it would have power and influence in this country. You represent one of the greatest of our industries, one concerning which there are the greatest possibilities in the future; and therefore do not run around in a circle making a road from which you cannot extricate yourselves. I can tell you of associations in this country which seem to get into a little circle, and have kept going around and around every year. Of course they had a convention; I never could see any use of it. They elected a few officers; they may have had an exhibition and carried away a few prizes, but as for any impression of the country, or any help to the poor man that was outside the ring, I could not find it. I have tried to spur them up, and those associations are alive to-day, and they are going to do from this time on a very much better work than they have ever done before. Now let me suggest that this association should never get into that position. Always remember that when you are helping yourselves and the class to which you particularly belong, you are helping me and and you are helping all the country. (Loud and prolonged applause).

The PRESIDENT: Gentlemen, I certainly think that the outlook for fruit growers and fruit growing at the close of the 19th century is just about all that we can desire. Everything is looking very favorable for us. I think the one thing perhaps that we have to dread, and that hangs like the shadow of a great calamity over us, is the San Jose scale. From what has been said this morning I shall be very glad to hear from some of you gentlemen in reference to this matter; let us hear what you think about it and what you think ought to be done. We are glad to know that at headquarters they are willing to do for us whatever we may ask, I think.

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REPORT OF THE COMMITTEE ON SAN JOSÉ SCALE.

By Murray Pettit, Winona, Ont.

I must first apologize for not having my report prepared, as I did not expect to be called upon until Friday morning. I have some notes which I intended to put in shape before that time. However, I will give you a few facts that I found by travelling through the infested districts for that purpose. It was thought advisable by your Executive that I should do so before this meeting in order that we might have an unbiased opinion of the condition of affairs which I found very much worse than was expected. The scale has increased and multiplied in those districts to an alarming extent. I first visited an apple orchard that was inspected in 1898 and considered free from scale. This fall at picking time the owner found that every tree in the orchard was infested, some of them so bad that the fruit was worthless. This was an orchard of about 400 trees 25 years old, a fine healthy orchard, and it is his intention to take out a portion if not the whole of it this season. The next orchard I visited was one of 300 trees, an apple orchard. In 1898-99 all the scale that was found in that orchard was taken out. At the present time there is not a single tree there that is not infested. On the same farm there is a peach orchard of 800 trees that was inspected in 1898; four trees were found infested and taken out. At the present time there is not a single tree in that orchard that is not infested, and many of them so bad that the fruit was worthless. Another orchard I visited was a pear orchard inspected in 1898 and considered free from scale. That is now so completely coated with it that from the road you can see that the trees are covered with scale; even into the orchard a rod or two it shows and the same in another orchard of 800 or 1000 peach trees about 100 of which were taken out under the conditions of the Act in 1898. At the present time every tree in that orchard is infested. I could go on and enumerate many more, but this is just about a sample of the condition of things in those infested districts. While talking with some growers in those infested districts, one who has had considerable to do with inspecting the orchards and has watched it closely said there was a section there of about twelve square miles where he did not think there was an orchard that was not infested, and in a good many of them not a single tree in the orchard but was infested with scale. In talking with another intelligent grower there I asked him what he thought could be done or what the outcome would be. He said to rid that locality of the scale every fruit tree and shrub would have to be destroyed, and then he thought it would not be safe to plant for a few years.

Hon. Mr. Dryden: Did you get any information as to what this gentleman thought better be done under the circumstances? That is what I am specially anxious to hear.

Mr. Murray Pettit: Well, I found that public opinion had changed very much since 1898, and many people who then thought it was a mistake to go and destroy orchards, hearing and believing that this scale was not really as dangerous as a good many supposed, have changed their minds very much, and I think would now be very glad to have that same Act enforced as it was then.

Mr. Morden: Did you examine the forest adjacent to the orchard?

Mr. Murray Pettit: I did not, but there is one place in that section where the forest trees have been chopped off and there is a new growth come up, where the conditions would be very good for the scale if it would attack forest trees, and I am told the inspectors have spent a great deal of time there and they have not in one single instance found scale on forest trees.

Hon. Mr. Dryden: We have never been able to find it.

Mr. Murray Pettit: They offered a dollar to any person who would bring them a piece of forest tree wood with scale on it, and they had a good many specimens sent them but none of them was San José scale.

Mr. Morden: Take wild rose bushes in the forest; would they have it?

Mr. Murray Pettit: I could not tell you that. One very successful grower where scale existed said that if he were furnished first-class trees and paid $1 each to plant them and take care of them until they died he would not take them—which does not seem a very encouraging outlook for fruit growing in those sections. I also visited different orchards where spraying had been done under the Commissioner, and where different brands of whale oil soap had been used and also petroleum. The trees sprayed with

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whale oil soap from Ohio were cleaner than those sprayed by other soaps. But where petroleum had been used the trees were much cleaner than where whale oil soap had been.

Hon. JOHN DRYDEN: They used all sorts of mixtures. I think crude petroleum is used, and then the ordinary refined oil mixed with water in different percentages. I have never seen any actual report of the effect of these different treatments, but on general principles I think that what Mr. Pettit is saying now is correct, that the crude petroleum is perhaps the best, but they tell me there is a difference in the petroleum coming from one place and another; that one is better than another.

Mr. MURRAY PETTIT: They register different degrees of strength, I think. One grower who had used three tons of soap had absolute faith in the soap keeping the scale in check. The inspectors had different marks which indicated bad, medium and slightly infested, and where these experiments were tried on those trees in these different conditions you could arrive pretty closely at the results, but it was decidedly in favour of petroleum. It is a very important question with us as to what can be done. It looks like a terrible undertaking now to stamp it out, but it seems to me that in localities that are free from it we should undertake to do something. Even in municipalities that are free, or nearly so, it would be well if we had legislation similar to the Act in force respecting the Codling Moth, to be adopted by municipalities, obliging every grower to inspect his trees once or twice each year, and to certify before a commissioner that he has done so and also whether he has found any infested trees or not Then under the San José Scale Act as it now exists these trees could be ordered destroyed; a great many sections could fight the scale for some years and possibly keep certain sections free from it. The municipalities bordering on the lake shore where one side would be protected in that way would be an advantage.

Hon. JOHN DRYDEN: Do you think municipalities would themselves consent to pay something towards the cost of destruction?

Mr. MURRAY PETTIT: I think some municipalities would.

A DELEGATE: Does it require a very strong glass to discover the scale?

Mr. MURRAY PETTIT: No, just an ordinary little lens, in fact where the tree is badly infested you can see it with the naked eye, in just walking through the orchard.

Hon. JOHN DRYDEN: This gentleman if he is not accustomed to it probably would not, as he does not know what to look for. The inspectors who have an educated eye can tell by the peculiar appearance without a microscope.

A DELEGATE: Does it affect the leaves—change the color or appearance?

Hon. JOHN DRYDEN: Yes.

Mr. A. H. PETTIT: Did you find any instance where the trees had been injured in that way from the use of whale oil soap?

Mr. MURRAY PETTIT: No, not from soap; but I found where they had been injured from the use of petroleum.

Prof. SAUNDERS: Were the trees killed in that case?

Mr. MURRAY PETTIT: There were one or two trees killed and others were injured. I believe they scraped it off, and seemed to make a start again where they were scraped off.

Mr. JEREMIAH CLARK (P.E.I.): Did they spray the oil with water in it at all times?

Mr. MURRAY PETTIT: I think the strongest was about 40 per cent.

Mr. CLARK: I understood that in spraying in bright sunshine they could put on the pure oil.

Mr. MURRAY PETTIT: Yes. On damp days or in damp localities or in water I am told there cannot be as much oil used as there can in dry localities.

Mr. E. D. SMITH: There is a clause in the San Jose Scale Act that provides that the inspectors for the Yellows and Black Knot also inspect for the San Jose Scale. I would like to ask Mr. Dryden who is supposed to pay these inspectors.

Hon. JOHN DRYDEN: Those inspectors are appointed and paid by the municipality, I understand, but Mr. Smith will excuse me if I say I am a poor man to ask what the meaning of that law is. We never know when we make laws just what the meaning is till some Court or Judge tells us: so I do not exactly know how that is.

The SECRETARY: The cold storage car to which reference has been made by the Minister of Agriculture is at the Grand Trunk Station, Market street. I suggest that we go down to visit it at 9 o'clock to-morrow morning.

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Mr. A. H. PETTIT: The principle is just as simple as can be. Mr. Hanrahan's principle is nothing but the natural current of air, a perfect circulation, and in this manner: The fruit is put in; it being warm, the warm air rises. The moment it does that the cold air from the ice in the center of the car follows it and the circulation thus created is simply like two wheels running around in the car. As the warm air passes over the ice it deposits the impurities of the atmosphere and they run off in a liquid, while the air comes back in a perfectly pure condition. Before Mr. Hanrahan explained this to us in Grimsby we had instances of pretty nearly the same thing to prove it. Some of our shippers who were shipping in cold storage had placed some of their peaches in unloading in the north side of a large barn or packing-house, where it was in the coldest possible place and pure air. This is really not cold storage, it is only cooling the atmosphere and purifying it. It is one of the simplest things in cold storage that a man can imagine and when you see the car I think you will say it is perfect in every condition.

Hon. JOHN DRYDEN: The difference between this and the ordinary G. T. R. car is that the ice in this Hanrahan car is in the center, while in the ordinary car it is in both ends. The same principle works in an ordinary G. T. R. car, but you see then you have a current of air starting at each end coming against it, each working against the other. It operates something like two streams of water that you set running along the floor here; there is a portion in the center where there is a stagnation. These two currents of air naturally fight against each other and there is really no continuous circulation in the car when you have the ice at both ends, but when you put it in the middle you have two compartments in the car, one at each end, and the ice cools the air and it runs around in this way.

Mr. A. H. PETTIT: As there are eight or ten gentlemen in the room who have been shipping through the season and shipping in this car three or four times, I think everyone will express his delight and pleasure at seeing a system that seems so thoroughly perfect in carrying our fruit in cold storage.

Prof. SAUNDERS: I may say that this system was adopted in 1886, when we sent over to London a display that astonished London at that time, and we showed about 5,000 plates of fruit at one great exhibition of the Horticultural Society. Mr. Hanrahan fitted that cold storage chamber up as a temporary thing in one of the Allan vessels, and the fruit all reached there in perfect order. Mr. Dempsey's father was one of the men there at the time, and Mr. Starr of Nova Scotia, and Mr. McD. Allan, and Sir Charles Tupper also mentioned in his report of the exhibition the wonderful success that had attended this exhibit of fruit which reached London in this fine order in a similar compartment on the same principle to what has been spoken of lately. I have listened with the greatest attention to the speech of the Hon. Mr. Dryden to-night, and am very glad indeed to find that any man occupying the position that he does has been willing to give the time and attention to such a subject, to master it so thoroughly as he seems to have done. It is so seldom that busy men, especially men occupying high positions politically, can find the time to go into these details, however much they may have the will; but he seems to have devoted all the time that is necessary for a thorough knowledge of the subject, and I have the greatest faith in the future under such circumstances that any obstacle arising will be overcome as long as we have a man like him at the head to direct.

VOTE OF THANKS TO HON. JOHN DRYDEN.

The Secretary moved, seconded by Mr. Harold Jones: Resolved, that the thanks of the Fruit Growers' Association of Ontario be hereby tendered to the Hon. John Dryden for his excellent and encouraging address and for the efforts made by him to check the spread of the San Josè scale; and further that we hereby extend to him our sincere thanks for the successful work accomplished during the past season in the experimental export of tender fruits and that we hereby express the hope that he will continue to interest himself in furthering this business until it has become established on a trade basis." The motion was carried unanimously. This motion was seconded in several places.

Mr. MORRIS: I would like to ask if there is any probability or chance of the government resuming the plan of destroying the trees for the San José scale, even with the

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help of the Dominion Government. The two Governments could work together. As I understand now it would be impossible financially for the local Government to undertake it, but if the Dominion Government took it in hand as well as it could be done, and I think under the representations of Prof. Saunders they would assist.

Prof. SAUNDERS: The Dominion Government is spending a great deal of money now in fumigation chambers.

Mr. MORRIS: I think the feeling of the country is that that is the best plan yet, and if the money was only forthcoming that that will be the cheapest way in the end.

Hon. JOHN DRYDEN: I do not think any answer can be given to that I cannot answer for one Government let alone two. (Laughter.) I am afraid that you will have difficulty in getting any Legislature or any of our Legislative bodies to agree to such expenditure of money. The trouble is that in this matter no living man can tell now hew much it will cost, and I want to tell you further that if you are going to destroy a man's trees you have got to give him a little more that we have been giving him under our present Act, or he comes out with a shotgun and an axe or two and drives you off the premises, and I do not know that I can blame him very much. The individual is sacrificed for the benefit of the whole, that was our theory, but nobody dreamed that we were going to cut out the whole orchard; we thought we were only going to have two or three spots, but men rebelled, and that was the difficulty.

Mr. MCKINNON: Although I cannot express an opinion as to whether it would be expedient to go on with the destruction of trees infested with the scale or not, I would say that if it is necessary, in my opinion the Dominion Government much more than the Provincial Government should be the one to saddle with the expenditure, for the reason that when fruit growers asked the Dominion Government to prohibit importation of nursery stock from the infested States some years ago they refused to do it. If they had done it I believe we should have had no such enemy to fight. (Hear, hear.) Then it was not within the power of the Provincial Government to prevent the importation, it was within the power of the Dominion Government. It was on the advice of their professors I believe—I do not know whether it was Prof. Saunders or Prof. Fletcher, or who it was—but on the advice of their official advisors they declined to do it, on the ground that there was no danger whatever of the scale making headway in such a cold climate as that of Canada. Now, if they are responsible for all the evil that has come upon us, are not they rather than the Provincial Government the parties who should put their hands in their pockets and try to rid us of this evil if it can be done at all? (Hear, hear.)

Prof. SAUNDERS: I think I must try to correct Mr. McKinnon's facts, because I know something about the history of this business. I know that the Hon. Mr. Fisher took the very promptest action possible as soon as it was brought under his notice, that it was desirable to take this action, and by so doing he prevented that year the scale going to every part of Canada, as it would have done by the sale of diseased trees from different parts of the United States in every part of the country. The action of the Dominion Government was so prompt that it shut off all probability of the scale going any further, and it was done just as soon as the information was presented to the Minister. I do not think there is on record any action of the Government taken at any time in connection with any law affecting the welfare of the people that was done in such a short time as that was done, and they were most prompt and energetic in carrying out the law.

Mr. MCKINNON: It was before Sydney Fisher had anything to do with the Department of Agriculture for Canada that this happened. (Hear, hear, and applause.)

Mr. MCNEILL: There is another aspect of this affair. Whether the Provincial Government or the Dominion Government do anything for us or not, the trouble is upon us and the trees are going to be destroyed. It appears to me that we have just got to look this condition of affairs in the face, and now that the scale is being recognized as being here, and every intelligent fruit grower is supposed to know something about it, that we will simply have to bear the expense ourselves individually, and that it will come in exactly on the same basis as any other noxious disease or pest, and that it will take its place just beside those. Now, we get no compensation when we have scarlet fever at our house, and have to shut up shop, and have considerable difficulty with our business, and have to fumigate, and all that. I believe we have just got to face the difficulty in exactly the

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same way with the San Jose Scale; that as no man is allowed to keep a mad dog on his place, so no man will be allowed to keep San Jose Scale on his place—(Hear, hear)—and that he himself will have to be responsible for ridding his orchard of that pest. The thing has got to that pass that we may just as well face the music. I feel that I am speaking this in the presence of the Minister of Agriculture, from whom of course we take everything we can get. At the same time he shows himself to be a man of common sense, a man of ability, a man for the hour, and he will not misunderstand this when speaking to fruit growers. While I am on my feet I may say this, that I never listened to a more matter of fact and encouraging address than we have had to-night from the Minister of Agriculture in connection with this transportation and cold storage question, that if we as fruit growers just live up to our standard of the present time and show them we are alive I believe we shall begin the new century under very auspicious circumstances notwithstanding the scale.

Mr. MORDEN: It strikes me in this way. Imagine for a moment this scale infests my orchard. What is the result if we have no legislation, no action? My orchard is doomed; it will be of no value; and if I face the whole situation I am no worse than if nothing whatever was done, and if the Government does as they have done, give 25 per cent. of the value of that tree, they have done something that we may call generous. Taking the view of course that this is in the public interest, I do not consider that it is wrong in the Government to do it, but I fail to see where the individual can grumble because his orchard is doomed. If it is a contagious and infectious disease and 25 per cent. of the value is paid I think the arrangement is very liberal indeed under the peculiar circumstances, as the trees are of no value.

Hon. Mr. DRYDEN: Mr. Morden does not quite appreciate the position of the men whose trees are attacked. When the attack comes first his orchard is not destroyed; it takes a good many years. The man looks at it in this way; he asks, what is that orchard worth to me next year, and the year following, and the year following that, before the scale gets a real foot-hold? Now when he goes to the court, the court will not give him damages for what the orchard is worth in the future, and we have acted on that basis. The inspectors say, these trees are diseased; they are doomed. They say they are not worth so much as they were when they were healthy, and they knock off a little percenage from that. I confess to you when they get off the percentages and only 25 per cent. is left it is a mighty small sum, and the man will not stand it. We have absolute rebellion in some places—men out with axes and shot-guns and saying, "You dare chop down that tree and I will chop you down;" and you have got to face that. It is a sacrifice of the individual for the whole, and while I believe what Mr. Morden says, and while if I have scale in my place to-morrow I would cut the whole blessed thing down and burn it, yet men do not take that position and the legislators will not face it.

E. D. SMITH: What is the position of the man who has got the scale, and the other man has not?

Hon. JOHN DRYDEN: He ought to be protected.

E. D. SMITH: By the report Mr. Pettit gave this is spreading to a most alarming extent, and unless some stringent measures are taken at once the man who has not got it now will be overtaken by it in a few years. I think we should take immediate action to have some law by which the man who has not got the scale could be protected. (Hear, hear.)

The PRESIDENT: Do you think it possible to have anything better than what we started out with in the first place?

E. D. SMITH: That is the cutting down with 25 per cent. compensation? No, I don't think so.

The PRESIDENT: Didn't we start out on the right lines exactly?

E. D. SMITH: Certainly, I always thought so. I thought the amount given was most generous, and I always thought it was a tremendous mistake that those men refused to bow to that law.

Hon. JOHN DRYDEN: What happened? Somebody up there in the County of Lincoln sent down men to represent the fruit districts of this country in the Legislature, and they stood up there and fired their shots at me, and said, "This man does not know what he is talking about. I tell you it is all nonsense; the scale won't hurt anybody. You can't find it; it doesn't exist," and all stuff like that. What am I to do? I

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have not got you people down there to back me up, that is the difficulty, and I was reluctantly forced and compelled by force of public opinion to stop the operation of the law. I believe we were on the right track, there is no doubt about that; if we could have spent a few hundred thousand dollars more, if need be, and have cut it out altogether, it would be a great blessing, but there was the trouble—public opinion was not with us.

E. D. SMITH: I do not think the Government now would be justified in paying that amount when the people who were most interested refused to accept the situation as it was then, and generous as it was then, now that it has spread perhaps over ten times greater area, and will cost nearly fifty times as much money to stamp it out. It seems to me that Mr. McNeill's suggestion is on the right track, that we have got to face the situation now as we have had with other diseases, the yellows and black knot, where a man was caused to cut them down and suffer the loss himself, and a statute more stringent even than The Black-knot and Yellows Act ought to be on our books at once.

A. W. SMITH: About a week ago I listened in a meeting to some of those very same men who made this protest, and they candidly and publicly acknowledged that Mr. Dryden was right, and they were wrong—(Hear, hear)—and if the thing had gone on as he started it, it would have been the best thing that could have been done for the country.

Mr. BUNTING: The gentleman who was strongest in opposition in the House about the scale, only on last Saturday was obliged to admit his mistake, and to agree to support almost any measure that the fruit growers of the Niagara district would bring up and send to him for representation in the House. This only shows that we are to be congratulated on the ability Mr. Dryden has shown in listening to the views of the fruit growers and endeavoring to carry them out.

Hon. Mr. DRYDEN: I am delighted to hear that. It is only an illustration of what I was saying a little while ago—the force of public opinion has had its effect on that gentleman you see. Public opinion is now working in that direction, and he is going to fall in with it. It only shows that you gentlemen have only got to stand behind and form your public opinion and you can get any law you want.

Mr. MURRAY PETTIT: But the great trouble was our hands were tied. This Association and our journal and all those who were willing and anxious to see the Act enforced, were quiet for the same reason that Mr. Dryden referred to in regard to the reporters; we did not want it to go into the press and all over the country that we were being overrun with San Jose Scale. We were not trying to rouse public opinion, while those who were opposed to it were doing all they could. It is just the difficulty.

Hon. Mr. DRYDEN: I should be very glad if, after having talked it over, this Association would express themselves in some resolution as to what is the proper course to pursue. I shall receive with all the importance it deserves whatever conclusion you gentlemen come to. I do not say what we shall do or can do; I am not prepared to say at the present time: but it is going to be a difficult matter to carry on our old operation I think.

The PRESIDENT: There have never been two opinions expressed by this Association or any member of it, so far as I know on this matter, We have never faltered. (Hear, hear.) We want destruction at any cost. The question will come up again.

The Secretary suggested that, as the minutes of the last annual meeting had been printed, they be adopted as printed. This suggestion was carried.

REPORT OF FINANCE COMMITTEE.

The Secretary read the report of the Finance Committee, which on motion of the Secretary was adopted.

We, your Finance Committee, beg to report that we have examined the accounts for expenditure made by the Executive and we find that they were made in the best interests of the Association.

We are pleased to report also that we found the accounts in perfect order for inspection.

W. M. ORR,
M. PETTIT,
A. M. SMITH.

Grimsby. Nov. 23, 1900.

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TREASURER'S REPORT.

The Secretary read the Treasurer's report for 1899-00, which on motion of Mr. Scarff was received and adopted, as was also the report of the Auditors.

RECEIPTS.		EXPENDITURES.	
Balance on hand Dec. 1, 1899	$ 635 51	Canadian Horticulturist	$2,554 95
Membership fees	4,435 36	Salary of Secretary—Treasurer—Editor	1,200 00
Advertisements	355 53	Commissions	673 35
Samples, etc	16 00	Premiums	533 79
Binding volumes	31 35	Illustrations	439 34
Government grant	1800 00	Printing and stationery	250 93
		Bookkeeper	240 00
		Annual meeting expenses	230 40
		Affiliated societies (lecture course)	211 55
		Postage, telephone and telegrams	172 66
		Reporting	124 10
		Affiliated societies (organization)	103 67
		Committees and delegations	87 00
		Express and freight	46 36
		Collection and interest	43 69
		Book binding	39 15
		Auditing	21 00
		Miscellaneous	11 64
		Advertising	9 00
		Balance on hand Dec. 3, 1900	281 17
	$7,273 75		$7,273 75

The Secretary laid on the table the first printed report of this Association, held in 1861. The Association was then called the "Fruit Growers' Association of Upper Canada."

REPORT OF THE NOMINATING COMMITTEE.

MURRAY PETTIT read the report of the Nominating Committee, and moved, seconded by Mr. Harold Jones, that the report be adopted as read.

T. H. RACE: It is the privilege of every member of this Association to bring in an amendment to that report, and I am a member of that committee and would like that understood, because there are suggestions made sometimes that this is a close union and a self-appointing society. These nominations are simply made to be submitted to the Association for their acceptance or amendments.

The President called for amendments—there were none and the report was carried. The names of the officers appear on page iv.

FRUIT PACKAGES FOR EXPORT AND OTHER PURPOSES.

BY L. WOOLVERTON, GRIMSBY, ONT.

The need of uniform packages for our fruits is at the present time most apparent. We are just entering upon a new era in our fruit trade, an era of growing and shipping only first class fruit, graded to uniform sizes. For this fruit the box is better than the barrel, and has been used for three years past in our experimental shipments.

In this connection it will be interesting to quote from the *American Agriculturist* an article written by A. S. Baker, of Covent Garden, London, on the "Needs of the English Market."

"The London Market is not well understood in this country as regards the condition of apples: The people here with the finest men, the finest varieties and the finest soils, are getting the lowest prices for apples. England is dependant on three sources for her apples—the United States, Canada and Tasmania. Tasmania need not be considered, as her apples come in when there are none from America. The apples have to come 14,000 miles and the fruit when it reaches England is dry, flavorless and of poor quality. There are no such conditions confronting American growers, who are only 3,000 miles from London, and with good refrigerating plants on the ships.

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"The subject of package is of the greatest importance. Many packers put good fruit in both ends and poor stuff in the center. There are three sizes of barrels going to Europe. The buyer knocks out the head, dumps out the apples and makes an offer for the greatest quantity of one grade, which is generally the culls. The shippers would get as much to ship only culls and keep the little good fruit at home.

"The Tasmania package is a box 22 in. long, 11½ in. wide and 10½ in. deep, outside measurement, made like an orange box, with thin sides and three-fourths inch ends, bound with wooden hoops. It holds 50 lbs., or one English bushel. These boxes pack much closer in the hold of a ship, and as freight rates are based on the amount of cubic space occupied, 20 per cent. more fruit can be carried in boxes for the same money than in barrels. Barrels of apples contain too much latent heat and the fruit in the center does not carry as well. The boxes of apples shipped from Tasmania bring 15 shillings per box in 1,000 lots at auction. If the American shipper will grade his stock and pack it in boxes, he will get as much for a box of fruit as for a barrel which holds three times as much. Only two grades of fruit should be sent abroad.

"The remedy for lack of uniformity in standard packages does not, I believe, lie with the Government to pass a law upon this subject, but with horticultural and other societies to adopt a standard package. These should be labeled with the name of the society or board of trade, at the town from which they are shipped. If you ship to the English market the kind of goods and in the sort of package the Englishman wants, there is no limit to the amount of stuff he will take. London banks will advance 80 per cent. of the market quotations on apples to Tasmania shippers. These apples are never opened in the market, but the grades and marks being known, are sold this way. There is a system of inspection at the port of shipment by which the brand of the Sydney chamber of commerce is put on boxes of butter. The butter in Australian standard boxes will bring 112 shillings per 100 lbs. against not over 95 shillings for American butter."

The *Fruit Grower*, also of London, England, refers to Canadian apples in the English market, in an article from which we clip the following:

"What are your views upon the use of the bushel box for apples; do you think that it is suitable for all kinds of Canadian and American apples?" "Well," answers Mr. Walter Draper, "we are satisfied that for ordinary fruit the barrel is as good as any package that could be devised, but for choice, evenly-graded and well colored fruit there can be no doubt that the bushel box is a decided improvement. For such we would guarantee ready sales at good market prices, and in quantity, too. The Californian senders of Newton's adopt this kind of package, and we are sure the Canadian shippers will find such a box of great value from a trade point of view."

Now, it is evident that we have a magnificent market for our fancy apples and other fruits if we can once agree upon uniform brands and uniform packages.

After the experience of the past year we propose for our adoption the following list:

Apples—Barrel*, staves 28½ inches long, head 17¼ inches, circumference at bilge 64 inches. Box—22x11x 10½, inside measurement, with ⅜ inch sides, and ¾ inch ends.

Pears—22x10½x5½. Peaches—Box 18x10 x 5½, with ¼ inch sides and ¾ inch ends.

Grapes—Crate 16" x 16x4½, with ½ inch ends and ¼ inch slats, and containing four veneer baskets.

The barrel holds just 96.51 Imperial quarts, or 100 American quarts, while the barrel we have been using is the flour barrel size with staves 30 inches long, head about 17 inches, which holds 103 Imperial quarts.

The barrel which we recommend above is the one adopted by the American Apple Shipper's Association, and the Nova Scotia people, who ship a great deal to the Boston market, have petitioned our Government to legalize this barrel. I would ask that this Association appoint a committee to examine these packages now placed before you and to report upon the same.

I would also in this connection advocate the inspection of all goods put up in these special packages, just as our Tasmania friends are doing, or else we can never expect to have our fruit in them sold by grade, without having them turned out, as is necessary

* This barrel has been legalized by the Dominion.

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with the barrels at the present time. We want to establish confidence, and to do this we must see to it that we ship only inspected fruit true to grade marks.

I would ask that it be made necessary to mark on all the packages of apples, pears or peaches, the variety, the diameter, and the shipper's mark. This is perhaps enough, but if grade is also required, No. 1 means first-class samples of apples not less than 2½ inches in diameter, and pears not less than 2¼ inches in diameter; while A No. 1 means the same, but 2¾ and 2½ inches in diameter respectively.

Now to avoid the mistakes of the past, we should advocate that all fruit put up in boxes and sent forward in special storage be subject to Government inspection. I would recommend that a committee be appointed to consider this matter also.

I will be glad if you would adopt these packages so that we might all use the same, or refer it to a committee to examine and report. It is most important as we are entering on this business that we do agree together.

Mr. McNeill: As the secretary and others have given considerable attention to this matter, and have had large experience in shipping, I for one would be content to take his experience; and as some standard packages should be resorted to I see no better way of making a beginning than by adopting these. I would therefore move that these packages as named in the Secretary's paper be adopted as a standard as far as possible for the present, subject to revision every year. I would make no further recommendation.

Mr. Symington (Port Dover) seconded the motion, which was carried.

Uniform Fruit Packages.

An important meeting of the committee on uniform packages was held at Grimsby on Wednesday, the 20th of February, 1901, to discuss the question of uniform packages. The following resolutions were passed:

1. That, in the opinion of this committee, legislation should be enacted prescribing certain standard sizes of fruit baskets for use in the home markets, and that all baskets used of other sizes be branded indelibly with the minimum capacity in quarts.

2. That this committee would recommend the following standard sizes of baskets: No. 1, capacity 15 or more imperial quarts; No. 2, capacity 11 imperial quarts, with a depth of 5¾ inches; No. 3, capacity 6⅔ imperial quarts, with a depth of 4⅝ inches; No. 4, capacity 2⅔ imperial quarts, with a depth of 4 inches; No. 5, berry box, 1 Winchester quart; No. 6, berry box, 1 Winchester pint.

3. That the branding of sizes of baskets or berry boxes be compulsory in the case of imported fruit, as well as that Canadian grown.

WINDBREAKS.

By A. M. Smith, St. Catharines.

No observing man who passed through the country after the gale of last September and saw the thousands of bushels of apples under the trees where the orchards were not protected and noticed the fruit still upon the trees where they were protected, can doubt the usefulness of windbreaks; and no one, who had his orchard a part protected, and a part unprotected, but could fully appreciate their value when he came to gather his fruit. I think no one will question the statement that there was more than one-fourth of the apple crop of Western Ontario destroyed by the wind besides large quantities of pears, plums, peaches and other fruits, entailing a loss of many thousands of dollars which might have been saved had there been suitable windbreaks planted around the orchards. In my own experience I know that fully three-fourths of my apples, particularly of Greenings, went down in an exposed corner of my orchard while behind the windbreak there were very few if any.

In my peach orchard, which was protected by a windbreak of Norway spruce, there was scarcely a dozen baskets blown down, while many of my neighbors whose orchards were unprotected picked hundreds of baskets from the ground, which they were obliged to sell at half price or less. I am satisfied that my windbreaks of twelve to fifteen years growth have saved double their cost in fruit, besides in several instances having saved my peach trees from being winter killed.

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Two years ago, when so many trees were frozen out in Essex and in the Niagara district, several of my neighbors—whose orchards were exposed to the wind and the snow was blown from their roots—lost several hundred of their trees, while mine, only a few hundred yards away behind the windbreak, escaped uninjured—and not only my fruit trees but my berry plants have been greatly benefitted by protection. There was a time in the memory of some of us older men when we had forests enough to partially protect us from winds, and damage to fruit from them was a rare occurrence; but since they have been cut away the wind has free sweep through the country and not a season passes but we have more or less loss, and the question of protection and how best to accomplish it is well worthy of the attention of this association and of all interested in fruit growing. I am glad to see that the question of forestry, which is a kindred subject, is to be discussed at this meeting, and I hope that something practical will grow out of these discussions; for I believe that unless the forests and shelter belts which have been so ruthlessly destroyed in this country during the nineteenth century, are not at least partially restored in the twentieth that the twenty-first century instead of dawning upon a land of fruits and flowers and fertile fields as this Canada of ours is to-day, will dawn upon a land of barrenness and desolation.

Prof. Macoun: We have had considerable experience in tree planting at the Experimental Farm at Ottawa. One of the reasons why such good fruit can be grown in the Grimsby District, and in the Annapolis Valley, N.S., is because they are well protected; and I think it is very important in planting new orchards in the country to first of all look for natural protection, because, leaving aside the subject of wind protectors, if you get good natural protection your trees will not suffer from winds as they would otherwise. If you cannot get natural protection, the next best plan, as Mr. Smith has well said, is to plant windbreaks. By planting a Norway spruce windbreak at the time you set out your trees, it will make as rapid or more rapid growth than the trees, and by the time the trees need a windbreak, when they are in full bearing, it will protect them very much indeed. The Norway spruce will make from 2½ to 3½ feet in growth every year if you cultivate it properly for the first two years. It is one of the most rapid growing trees there is, and I believe that it is the best tree to plant for this purpose. We have a great many Norway spruce at the Experimental Farm, and after thirteen years experience there, I should say it was the best to plant for the purpose of a windbreak. I do not think it is necessary to plant a dense windbreak, One row of Norway spruce, with the trees from ten to twelve feet apart, will be quite sufficient because in 12 or 15 years those trees will be nearly meeting, and you will get a windbreak sufficient to break the force of the wind, which is really all that is needed. If you check the circulation of air altogether it affords a protection for insects and offers more favorable conditions for diseases spreading, so that it is much better to just merely break the force of the wind and thus protect the fruit from being blown off the trees, or the trees from being injured, than it is to stop the circulation of air to a much greater extent; so that in planting windbreaks I would recommend simply planting one row, or at the most two rows. If you plant two rows of trees I would suggest putting the second row behind the first, about ten or twelve feet from the first, and putting the trees opposite the intervals in the first row so that it would act as a screen. During the last three years we have planted a windbreak on two sides of the orchard of the Experimental Farm, and I expect that in time that will be a great protection to our orchard, which is very much exposed. I am very glad, indeed, that Mr. Smith has brought up this subject, because I consider it a very important one.

Mr. McNeill: I am glad that the Professor has put in that proviso about having the windbreaks thin. Personally, I would have them 30 or 40 rods apart if I were planting for windbreak. I must say that my experience is not favorable to windbreaks on the whole. No doubt there are many advantages, as has been enumerated here, and for certain sections of the country no doubt a windbreak is an advantage, but at the same time we have numerous examples, in the County of Essex at least, where the windbreaks have been a positive injury, for the first five or six rows of peaches particularly. A windbreak is merely for the purpose of breaking the wind in severe climates. It is of no special value, so far as I can see, in the southern portion of this Province particularly. I really never could see the great advantage of it in winter protection. It was of no advantage to us in 1899—merely a windbreak; and I must say that I never could see

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the economic advantage of the windbreak. It takes a great deal of plant food. Where it is allowed to grow thick it is certainly a protection for fungus diseases and insects; and while it is picturesque, and while I admit I would do a good deal for that alone from the esthetic side, from the economic point of view I have yet to be convinced that there is any advantage in a windbreak.

The PRESIDENT: Did you have any experience in the Leamington district or in your own vineyard that year?

Mr. McNEILL: In my own vineyard, as the result of bad farming and the efforts of my former neighbors, we had a windbreak for about 300 feet, a particularly dense one—so dense indeed that it was one of the things that I was always going to tackle, and it was almost two big a job for me—and it was not the slightest protection so far as the frost was concerned. The vines had been killed right to the edge wherever there was clean culture. The grass sward was a protection, and woods served a far better protection than did the windbreak. It was not a question of protecting from the winds at all, it seemed to be a question of the frost, so that where we had clean culture it went right to the edge of this wind-row along the fence. It is an old French farm.

The PRESIDENT: Did it happen to be on the right side of the windbreak?

Mr. McNEILL: Yes, the rows ran north and south, and it happened to be on the west side.

A. M. SMITH: Did it happen to retain the snow?

Mr. McNEILL: No, there was not enough snow to run a wheelbarrow.

Mr. PETTIT: That is just the point. Where we have snow and it drives away, we have damage on the vacant places, and that is where a windbreak would be an advantage.

Mr McNEILL: A cover crop would gather more snow and leaves and other accumulation of matter that will be a better protection from the frosts than your windbreak. A windbreak is very efficient during such winds as we had last fall undoubtedly, but beyond that I see no value in them.

Mr. MORDEN: A windbreak is out of the question where you have a narrow farm like Mr. McNeill's, because it takes up some room; but where you have wide farms or a series of farms it is a good protection, especially if planted on the crest of a hill, but a windbreak for frost protection is not of much use and a cover crop would be very much better. I have wondered a thousand times, however, that the farmers did not protect their buildings and their houses and their barns for their stock in the matter of winter's cold in the farmers' houses. In the middle parts of Ontario land is sufficiently plentiful to allow room for windbreaks, but no doubt there is a little waste and you cannot make the ground available right up to the very windbreak itself. A sparsely planted windbreak would not do very much service in a great wind such as we had last autumn. One of the great difficulties that fruit growers have is the tilting over of their trees from the south-west.

The PRESIDENT: Is there any need of having that trouble?

Mr. MORDEN: Well yes, there is where the wind abounds as it does in the Niagara peninsula.

The PRESIDENT: Cannot we avoid that by proper planting?

Mr. MORDEN: No, not always. No doubt something can be done in that directfon by slanting your trees more to the south-west, and that is all right, but it will require rectifying from time to time, and a windbreak will do a great deal in that direction to enable your trees to keep upright. I am speaking now of trees that may be a quarter of a mile away from the windbreak.

Prof. HUTT: I think this is a most important question, and I am glad Mr. Smith has brought it up at this time. I am rather surprised to hear our friend McNeill condemn windbreaks as he has done. I am sure if he had had a strong windbreak some years ago when his house was nearly demolished he would not have experienced what he did at that time. (Laughter).

Mr. McNEILL: The windbreak was not in it at that time at all.

Prof. HUTT: Windbreaks are certainly of great importance for the protection of buildings and crops throughout the whole country. I think Prof. Macoun is right in saying that the Norway spruce is one of the best trees for windbreaks that w e have W have a number of excellent windbreaks at the Agricultural College at Guelph. One that we like best of all is a Norway spruce tree, a double line of trees, the first row alternating

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with the second. The trees are about 8 feet apart and the rows 8 feet apart. I think that we might have them 10 or 12 feet apart. Another point is that it is very ornamental in summer, to plant the trees 30 feet apart and then alternate them with a row of maples. The light green foliage of the maples in summer time helps to relieve the dark evergreen and makes a very ornamental windbreak and an effective one in summer. In the winter time, though it acts as a screen, it has not the same value when the maple trees are bare. I think the idea of a windbreak should not be to make a dead calm under the lee of it, but simply to make a screen that will break the force of the wind. The arrangement of maples and Norway spruce as I have suggested gives a good screen and a dense windbreak at the time we want to hold our fruit on the trees. The maple holds its leaves on till all the fruit is off, and thus fulfils the full purpose of a windbreak. I hope the time will come when every farm will have its windbreak or shelter belt. Out in the West where we have been forced to give attention to this subject, they put up belts 30 or 40 feet in width of mixed trees, forest trees, and from those sheltered belts they can take timber as they grow up, and they keep cutting them ; cut off one row and have the other coming up and let that sprout up again and cut off another row—and they get their wood supply from these shelter belts. The trees used out in the Western States very largely are willow and soft maple. Of course in those Western prairie soils they grow with remarkable rapidity, and they keep up a constant supply of timber and firewood from these shelter belts and always manage to cut them so that they have complete protection. Out in that country they had no trees to begin with, and they have been planted largely, while we in this country have been cutting off the forests. I was rather surprised to find in the Western States that they had more trees and windbreaks than we had in this older and supposed to be better part of the country.

The PRESIDENT: What age would one of those shelter belts they put out there be before it would be able to supply sufficient wood for farm purposes?

Prof. Hutt: After the trees have been out fifteen or twenty years they can start and cut them. The willow they cut in ten or twelve years.

The PRESIDENT: That is a very important consideration for them.

Prof. HUTT: They get all the wood they want out of these.

Mr. McNEILL: I was speaking of a windbreak from an economic or fruit growers' standpoint. When you come to speak of forestry and its use in the protection of buildings, that is an entirely different subject, and there is no stronger advocate of forestry and tree planting than I am. I was just warning the ordinary fruit grower who cannot afford on his limited area of land to plant a windbreak ; but what has been said here with reference to the windbreak for buildings from an esthetic standpoint and as a cover for waste land is quite proper, and too much cannot be said of that. The point that I wanted to impress was that you could not get the crop for five or six rods from a windbreak. You are thus wasting a large part of very valuable land sometimes on small farms ; but certainly where you have large areas of waste land, and places where you can afford to plant windbreaks for esthetic and other purposes, as a matter of comfort, by all means have belts of trees.

Mr. HUNTER (Scotland): I have been quite an enthusiast at tree planting, and we have planted shade trees in our village for thirty years, but I am beginning to find some of the disadvantages. Windbreaks are like advice—you may get them in the wrong place. It seems very nice to have windbreaks in the barnyards to protect the buildings and so on, but in practice it is not so easily carried out. It is very difficult to grow trees in such positions, especially on those dry plains of Burford and Fairfield. I have planted trees close to the barnyard, and have mulched them and worked around the roots, but they get so hot and dry that it ultimately destroys those young trees and we can get very few of them to grow in those places. Then there is a great deal of traffic around the barns—waggon work and machine work and cattle going around, and those trees will get run over and tramped over and destroyed. It would be a matter of great expense to get any decent trees around a barnyard. You can get them round a kitchen, where nothing is allowed to come, just where it is least required. We have shelter belts around Norwich, running the entire length of the farm, and it certainly has a wonderful influence upon the air. You can go there in the winter when it is blowing a cutting gale and it does not matter which side of that wind protector you are on, you will see the benefit of it—it seems as if the weather had moderated a great deal and it has become nice and calm.

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I planted trees twenty-five years ago that afford me a great advantage to the orchard, but we find great damage from the roots, and we cannot grow crops up to within two or three rods of the row. Soft maple particularly takes a lot of moisture. Even if I put on a heavy coating of manure on that ground those trees seem to get the benefit of the manure, and I have had to cut a heavy drain near the fence. I find they are a protection to my trees from getting sun-scorched, in protecting the one side, because it is well known that even planting will not guard against that. You might plant with an angle towards the one o'clock point if you like, but when it comes on a heavy rain and the ground gets really wet in the summer, then comes on a gale from the west, even if you are protected the tree will lean over. You must upright those trees and tramp the ground solid a little to the west of them again or they will get away from you. These are trees that were planted five or six years ago, and many got leaned over last summer when the land was very wet. I find no trouble so far as the hardiness of the fruit trees in winter is concerned. Just as a tree is protected so it is equally tender; as it is not protected so it is equally hardy in the strength of the bud and its ability to stand cold. It is well known that the home of the peach in this country is in the mountains of Virginia, away up in the highest places, dry and unprotected, and I find that where they are more protected the twig grows slender and more delicate, it does not seem to be able to stand the weather and be productive as those in the open. The same remark applies to grapes as far as we have tried them, only in a limited scale. I cannot grow such grapes as some of the Rogers original varieties at all within reasonable distance of this shelter—the mildew prevents them; but if I grow them in the openest place I can or where the least possible shelter is, I grow them without the sign of mildew, and they will ripen the wood better and enable them to stand the winter better than those that are grown anywhere near shelters. In fact the latter do not mature the wood at all; a great deal of the wood will be green when the winter comes on; and in that way it is a doubtful benefit so far as the hardiness of the peach or grape is concerned. The apples seem to vie with the maples, although the maples may be a great distance from them, in getting their tops up slender to get breath. You must be able to spare quite a breadth of ground for these wind breaks if you use them anywhere near your fruit trees. It would be a great advantage at a distance, but not close.

Mr. Graham: Having one of the oldest windbreaks in the Province, I feel the advantage more and more every year. My orchard is in the valley and I live up on the mountain where there are some very fine trees around the house, but before those are matured they are nearly all on the ground; whereas the very large Kings will hang until they are fully matured, right until falling, and I certainly would urge every one who has a natural wind protector such as the side of a mountain to take advantage of it and plant your trees there. Up near Collingwood mountain, where the wind has got a sweep, thousands of barrels of fruit have been swept away during the last two years just for want of a windbreak.

Mr. J. W. Smith: Not only a windbreak in the shape of trees is good, but where there are hills in the right direction it is a good protection. Being in the nursery business I have looked this matter up somewhat. A year ago last winter there was a great loss of nursery stock where there was a wind protection where it held the snow, but there was no hurt to the trees, neither to the nursery stock nor to the bare trees. My farm runs up the side of the mountain and runs down half a mile. Well, within a quarter of a mile of the mountain I never lost a tree nor a vine, but when I got to the lower end of my place, I had an orchard there that I lost about 35 or 40 per cent. of the yield. A windbreak holds the snow when it is in the right direction whether it is a hill or whether it is planted. What we want in this direction is to get the snow to lay where it falls. After a thaw the water begins to run about 60 or 70 rods distant from this mountain; but go near the windbreak and the snow lies there and does not wet it enough to let it run. The water runs down on the frozen ground and leaches, and it makes no difference. While it is laying, if it comes a heavy frost it will freeze the trees. Up near Leamington the trees freeze down when the weather becomes cold and the lake freezes over, because they have not enough of snow. A windbreak north and south won't do it, but if they have a windbreak east and west at intervals I will guarantee it will save 75 per cent. of the trees that are now killed one year with another. Two-thirds of the peach trees in the vicinity of Jordan, one of the best peach countries in Canada, are on the

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high land, and two-thirds of the crop this year generally was not fit for market. Why? Because the trees were not protected. But go up near the ridge where they were protected, and every orchard has good fruit. Few of them knew the cause was root-killing. Near St. Catharines I found a whole orchard of Keiffer pears of 50 trees, and all the fruit was laid on the ground after that terrible wind rushed over them. If that orchard had a windbreak just to the south end of it, there would not have been 10 per cent. of the fruit off.

Mr. HARRY PICKETT (Lorne Park): You cannot grow small fruit to perfection in an exposed position where wind has full sweep, because it dries out the surface of the soil so much. With small fruit where it is sheltered you can get the best result.

Mr. J. W. SMITH: As nurserymen we take up our trees and heel them in. If we take up a tree and heel it in properly, which we do sometimes, in an exposed place, and the thermometer runs up to 80 degrees, which it does sometimes before we can get them out to our customers, and there comes a wind, say twenty miles an hour, and it blows all day for two days, you will see that the tops of those trees are wilted, and if not watered very soon and the parties to whom they are sent do not take care of them, they will begin to dry up, and they will blame the nurseryman for it. If you had a good windbreak around your packing ground to the south and west it will prevent the wind from blowing through there, you can keep them for four days and in better condition. Trees heeled in a nursery in a cool time, will keep for three or four weeks, but it is the wind blowing twenty or thirty miles an hour that dries our trees out. A windbreak will prevent that.

Mr. SHERRINGTON (Walkerton): I think I can solve the problem of these gentlemen in the south. Sell out and come to the county of Bruce. The snow will stay when it comes. I left home Monday morning and had good sleighing. The snow stops with us all winter. You can go out in January and dig the ground. No frost in the ground. We are not so troubled with being frozen out in the winter; the ground is dry and no frost in it during the whole of the winter. You may think sometimes we are very late in the spring in getting on to our land. As soon as the snow goes away we are ready to go to work and the ground is ready for us; there is no frost in the ground. All our plans go right on. The snow fell this year a little earlier than usual; it fell a week ago last Sunday, and it is still on the ground I presume, and very good sleighing, and this stays with us until April and it goes away. I have some dewberry, the leaves of which remain green right through the winter. I would like to have some of you gentlemen come out there and start fruit growing. We have a country there that is second to none in Ontario; we can grow everything except peaches and grapes, and we are growing peaches. In a few years I think we will be able to show you peaches that will just make you hustle.

The PRESIDENT: Peaches will not stand 20 degrees.

Mr. SHERRINGTON: They do with us.

The PRESIDENT: They must be thoroughly matured.

Mr. SHERRINGTON: We have peaches that have stood 30 degrees below zero, and fruit every year. There are trees there sixteen years old that have never missed but one year in fruit.

The PRESIDENT: What variety?

Mr. SHERRINGTON: It is a seedling of the "A 1." Mr. A. H. Pettit has seen it. I have travelled considerably as a judge at fairs at Port Elgin, Lucknow, and all through there, and they all say they have peaches every year. I think there is something in this, that it does not seem to thaw out as it does in the south. The temperature seems to stay more even during the winter, and the buds don't seem to start out till later. The same with pears. I think there is a great deal in an even temperature during the winter.

The PRESIDENT: There is no doubt your conditions for the roots of the trees are much better than they are with us.

Mr. SMITH: We would like to go up there for our meeting next winter.

Mr. SHERRINGTON: I have mentioned that for several years. They are very much interested in fruit growing up there; that district is going to be one of the very best apple districts in the Province, pears and all kinds of small fruit the same, and the farmers there are very much interested, and they would be very anxious to have this Association hold their annual meeting with them another year; and the reason I am pressing it now is that I think when people are ready for it, that is the time to get in.

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The feeling may go off them again and they would not probably take hold. They would at the present time. It is not the town that is agitating, it is the farmers.

Mr. HUNTER: Is the San José scale up there?

Mr. SHERRINGTON: We have not got it, I hope I think it would be to the interest of the Association, if they want to extend the influence of this organization through the Province, to go up there for a meeting.

A. M. SMITH: Put in your application for next year.

Mr. SHERRINGTON: This is the third or fourth time we have applied for a meeting, and we are getting tired. You talk about apples. I think the average in our section would be in the neighborhood of 40,000 barrels. We put up 22,000 barrels ourselves, two of us, besides other packers. For quality we do not take a back place with any part of the Provinee.

FORESTRY FOR FARMERS.

BY L. B. RICE, PORT HURON, MICH.

I would be very glad on this occasion if I could say some complimentary things of you. We bring to you the greetings of our Society, and know that you are doing a great work, but I am especially interested in your meeting.

In taking up this branch of foresting, I find that I am very much in line with two of those whose names appear on the programme as preceding me.

I am glad to come before you to present a subject to your consideration in which I feel so much interest, and at the same time one of such vital importance to Ontario.

On my way from Port Huron to Brantford on the train, of the hundreds of wood lots along the road, I did not see one that was properly cared for. In no case was there any chance whatever for young trees to start, and sooner or later the old will be gone and none to take their place, and unless the owners are roused to the situation, your beautiful hills dotted with bits of forest will become bare and bald. In our own country the same conditions exist.

In taking up this subject, I would have been glad to tell you of the work being done in my own State to preserve large tracts of forest land and protect it from fires and from thieves, or to have told you of the great work being done by our general government in the same line, or in helping corporations or private parties who wish to plant out new grounds, by sending out expert men to advise in selecting location or in planting out the trees. But my time is all too short; I must narrow down my talk to the farmer of to-day in his present needs, for the proper care of such small lots of timber as he may have on his farm, or with the man who wants to plant out a young forest either as a wind-break, or shelter belt, to meet his future wants for wood, posts or timber, or to be a source of profit in ten to twenty years.

I shall not take up the subject from the sentimental point of forestry from the love of the trees or the beauty of the landscape, but from the cold business standpoint of dollars and cents. I want to have a home talk with the man who has a small piece of woodland left on his place from the destruction of the great forests that grew all over this land only a few years ago. After that I will have a word to say to him who wants to plant out a new grove of timber.

To the first I want to say that your trees lack vitality, many of them have died and you have cut them out for wood or for timber, and of those that are left, few have made very much growth in the last ten or fifteen years, and dead tops and limbs are to be seen everywhere. Soon the day will come when you will be called to cut those out too, and you have no young saplings moving up to take their places. Like the old veterans of the sixties they are fast passing away and soon the last one will be gone. What is the matter with them? That is just what I want to talk with you about. If you will listen for a few moments I will try and show you where you have done wrong. I would like to tell you of the mysteries of the forest depths, of the elves and the fairies who dwell there, and watch the falling seeds and the nuts, and cover them over with leaves that they may grow into other trees, that plant the wild flowers and feed the song birds.

Only a few years ago your little timber lot was a part of the large fores where the wild deer and his companions roamed at will. The sunlight never penetrated its depths,

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and the winds never rustled the fallen leaves. Every autumn the ground was covered over with a nice new clean coat of leaves, while those that fell the year before went rotting on the bottom making a ready prepared food for the trees when they should start to grow in the spring. In addition to this warm coat of leaves, the first snows of winter came sifting down through the lofty tree tops and gently and evenly spread a blanket of white over the leaves, the old logs and the brush, there to remain during the long winter, an additional protection from the cold. Though the storms rage over the tree tops, no wind disturbs this blanket of snow, but each succeeding one spreads more snow to add to the warmth.

But how does all this apply to my wood lot? I will show you. Under these warm coverings the frosts of winter never penetrated, and the leaves hold a reserve of moisture against the drouth of summer. In this loose loamy soil, made rich by the rotting leaves and wood, the feeding-roots of the trees found abundant food to give them luxuriant growth. The result of this was that all of the roots were spread out near the surface of the ground. This was proved by the over-turned tree showing that no roots struck down but all were flat on the surface. Now, if you remove this warm, moist covering from the ground what will be the consequences? The roots of those trees that never felt the frost before will be frozen solid in winter and pinched and shriveled by drouth in summer.

How have you removed the leaf covering? You have cleaned away the large forests, and left only a small tract of timber. This you have pastured till the cattle and sheep have eaten all the young growth that was coming on, and nothing is left to break the force of the wind. Now it rages through the woods and the autumn leaves and the winters snows have been swept away. Under these changed conditions with these tender roots both frozen and dried do you wonder that your trees are dead and dying? The only cause for surprise is that any of them are alive.

A few of the younger elms and soft maples will adapt themselves to these new conditions and strike a deeper root, and survive the ordeal. But all of the older trees must go sooner or later; their doom is sealed, and they must go unless you can restore the original condition of things before it is too late.

Nature has provided a renewal system for its forests. It is a system that has been on trial for a good many thousand years, and so far it has worked well.

In the forests primeval down to this date the old trees have died and fallen and the younger ones are already well grown to take their places. As with man so with trees, the old and feeble have fallen during decade after decade, and the younger and the sturdy have so soon closed up the vacancy that they have not been missed.

What is this renewal system? It is simply this: The little winged seeds come fluttering down to find a lodgment, the maples, the elms, the ashes, the poplars, the beechnut, the chestnut, and the acorn, and the leaves come after and cover them over. Early in spring the tender young shoot stands up through the leaves, and the tree of the future appears. Who is there that has not gathered the delicious young sprouts of the beechnut in the spring and eaten them? The woods are full of these young trees, the pine, the hemlock and the cedar, all struggling for existence, but you have turned in your cattle and your horses, your sheep and your hogs, and have browsed and trampled and routed till there is not a young tree left. Thus you have destroyed what little protection there was to the wind swept ground, and there is no chance for a seed to stand. Now the question is, what to do to restore all of these conditions so as to save the life of the trees. The first thing to do is to drive your stock out of the woods, then put up the bars and lock them, and throw your key away so that you will not be tempted to turn them in again.

Then let the grass and weeds grow as they will. They will make a "catch" for at least a part of the leaves, and hold them on the ground to make a winter protection for the roots of the trees.

We study to get the best winter protection for our orchards, and why should we not for our forests? Some few seeds from the trees will find lodgment in these leaves and weeds, and will get protection enough to grow. You can assist nature by going through the woods and scattering seeds of desirable trees with a free hand. In vacant places plant in walnuts, catalpas, or any variety of trees that you may want. You will be surprised to see how soon the young trees will cover the ground and the older

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ones will stand out with renewed vigor. You must allow a thick growth of underbrush of whatever kind around the outskirts of your timber lot, particularly along the fences, as it helps to break the force of the wind.

This manner of renewing the timber on the land will apply to any waste land, steep hill sides, river bluffs, or ravines, where there is already a sparse growth of timber, or where the timber has recently been cut off. To illustrate this I will give to you the experience of one of the best experimental workers in the country, Prof. Budd, of Iowa Agricultural College.

He says: "As an example of extreme rapidity of growth, twelve years ago I purchased 40 acres of recently cut bluff timber land for the small sum of $200. At that time I might have secured hundreds of acres of similar land, which now is cut up into homesteads, where the occupants make a scanty living by cultivating the marshy, porous soil. The 40 acres is now like an oasis in the uninviting tract, with an even growth of white oak, red oak, burr oak, hickory, ash, red elm and other valuable timber. Thousands of these trees are over one foot in diameter, and peculiarly tall and straight owing to their close growth. If cleared and the young trees utilized at the present prices for railroad ties, timber for wagon hubs, posts, rails, wood and other economic uses, the proceeds would far exceed the aggregate selling value of the crops grown on adjacent tracts of like extent for the 12 years."

Many of you have waste places on your farms where there is a sparse growth of timber or where the timber is being cut that is of little value for cultivation now in use for pasture. If you would fence the stock from these lands, and protect from fire, you might repeat the experience of Prof. Budd, on your own farms. Should you wish to change the timber you could scatter in seeds of catalpa for posts, of the white ash, oak or hickory for timber, or you could purchase cheap seedings of the chestnut or black walnut and plant in desirable places. Keep out the stock and the fires, and nature will do the rest, and you can rest assured that she will do her work well. Our work must be in harmony with her, and as nearly as possible restore the original condition of things. We cannot fight against nature without losing every time. Surely there is pasture enough on your broad acres without robbing future generations of the forests which are their natural birthright.

Now we come to the second part of my talk which is to the farmer and others who wish to start forest plantations, wood or timber lots, shelter belts or wind breaks. In these days of blizzards and tornadoes shelter belts and wind breaks may be the means of saving much property, for the young trees will strike a deep root, grown as they are in exposed place, and they will withstand almost any storm.

After you have made up your mind that you want a plantation, the next question is, what shall I plant? When we hear a man speaking of planting a new forest we think of one who is looking forward to the wants of his grandchildren to the third and fourth generation, but it has been demonstrated that a man who has passed the middle age of life may plant to meet his own wants on the farm or in the vineyard, or he may plant and look for good returns financially.

If you want stakes, posts or railroad ties, you will plant locust or the hardy catalpa. The latter will give the quickest returns but it is not absolutely hardy with us. It is on its northern limit here, but it has this advantage, if it winter kills while young it will send up a half dozen sprouts in the place of the one killed, for the root does not kill. If after it is older you can use it for posts and stakes, so nothing is lost, for your trees need thinning out as they grow. Even catalpas should be planted much thicker than they can grow to prevent their making tops too near the ground. If instead of planting catalpas to fill up the ground, which are worthless while small, you plant white ash, oak or hickory, you can sell the thinnings for hop-poles. These will bring, when 1½ to 2 inches through and 7 feet long, $10 to $12 per thousand feet, and as they get larger the limbs are good for timber and tops for poles or wood. White pine can only be planted for timber when it reaches good size, so it must have other trees between to produce good results. In planting either black walnut, white pine or catalpa, you should give the space that you expect them to occupy when good sized trees, and as it is necessary to have something between them to force them to struggle up to catch the light of the sun, thereby giving them tall, straight bodies without limbs, you will use something that has a commercial value, while small as stated. If I were

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to start a young forest I would plant 200 black walnuts to the acre; that would make them 14 feet 10 inches each way. I would then plant between them, with rows both ways, the catalpa for posts; this requires 600 trees, and they with the walnuts would stand 7 feet 5 inches each way. But experience has taught us that at less distance than that the catalpa will make heads in from 3 to 5 feet from the ground and be comparatively worthless, so I would fill in the one now and plant another between to make them as close as the trees in a nursery row, with a tree as above for hop poles requiring 10,000 trees.

I will give you some statements from reliable persons showing the profits that have been received from trees so planted out, and the growth made in a few years.

In former years the locust was planted throughout the country for post especially in the west, but the advent of the borer caused them to be discarded for the handy catalpa. Now thousands of acres of these trees are being planted by railroad corporations, and by private individuals for posts and for ties.

I quote from Bulletin No. 27, U. S. Department of Agriculture, Division of Forestry; "A plantation of catalpas near Hutchinson, Kansas, planted in 1892, began a year ago to reimburse the owner. (That would be in 7 years.). The trees taken out at that time made two posts each. One or two stakes could have been taken from the tops.

Another from the same: Mr. S. W. Yaggy, four miles west of Hutchinson, in the sandy valley of the Arkansas River, has 440 acres of catalpa. He planted at the uniform distance of 3½ to 6 feet upart. The first planting was done in 1890. When the trees were two years old they had formed tops within 3 to 5 feet from the ground. This was a serious defect, so the trees were cut back to the ground. After six years from the time of cutting back 2500 trees were cut out from eighty acres in thinning, only the larger ones being taken out, each making two posts. These were sold for $1240.

The same authority states that Mr. E. T. Hartley, near Lincoln, Neb., has one acre planted to willows, which has provided all the necessary fuel for the farm, and to-day there is more standing timber on it than ever before. The plantation is in a ravine of little value for other purposes.

I will add a word for the Carolina poplar as grown in Port Huron. In 1883 I planted a row of these trees on a dry sandy pine ridge in front of a house on Willow st Just before leaving home I measured some of them, and found them 6 feet in circumference 2 feet from the ground. Another lot planted the year before measured 6 feet 4 inches, same height. One of these trees would give a good 16 foot saw log, and more than a cord of wood from the top.. The wood is light, tough, and strong, and seems well adapted for any purpose where thin, light, tough timber is needed. I have specimens of the timber here, and would invite any one to examine them. But of all of the timber of trees of this latitude for profit, I think that the American black walnut heads the list. It is indigenous to our soil, and perfectly hardy, and is comparatively free from the attacks of depredating insects. It grows rapidly into a tree of noble proportions, and while it loves a rich, bottom ground it will thrive on almost any fairly good soil. Its roots strike down deep into the subsoil, and it gathers largely from the elements, and if the leaves are left on the ground it will enrich its own soil. It has sometimes been called a witness tree, because its presence is a living witness that the soil is rich. It will not stand the tramping feet of stock, and it needs the full protection of a growth of timber around it to attain perfection.

In the Michigan State Hunt Society report for 1882, on page 81, Wm. H. Regan, Secretary of the Indiana State Hunt Society, says, "A man in Wisconsin planted a piece of land with black walnuts 23 years ago. The trees are now 16 and 18 inches in diameter, and have been sold for $27,000.' The writer does not give acreage or number of the trees, so we cannot judge of the profits.

In the report of the same Society for the year 1885, I find an exhaustive report on the "Forestry Problem," from the pen of Charles W. Garfield, who has earned the name of "Michigan's Forest Champion." Mr. Garfield was at that time, and for several years before, Secretary for that Society. He says, "Mr. Hughs, of North Atchison, has had an experience of thirty years in tree growing in Kansas. Nine years ago he planted a lot of walnuts on his place in Doniphan County, and now they are large, vigorous, and handsome trees. For the first two years their progress was slow, but after that they grew as fast as cottonwoods. He picked half a bushel of nuts from

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each tree the 7th year, and the same summer they afforded a grateful shade." "Mr. Hughs is satisfied that a walnut planted in '82 will make a better tree in '89 than a soft maple of ordinary planting size, set out at the same time."

Mr. Garfield also reports the following: "Ten years ago Mr. Graves, of Texas, planted ten acres of black walnut by hand, 200 to the acre, in all 2,000 trees. The trees are now nine inches through, and are growing at the rate of one inch a year. Last year the trees bore 400 bushels of nuts, which brought $2.50 per bushel, or $1,000 for the ten acres, good interest for land worth $10 per acre." "If at the age of 20 years one half of the trees are cut and sold for $25 per tree, $25,000, the nuts from the remaining 1,000 trees will be worth $2,500 per annum." He might have added that in ten years more the timber remaining would be worth $50,000. This is certainly a good investment, but it is much easier to figure large profits on paper sometimes than to realize large profits in actual business. "The hills are always green in the distance."

I will give you one case more. Mr. C. B. Wilson, of Jacksonville, Ill., drove me out to his farm some time ago to see some black walnut trees. I measured them and they were sixteen inches through.

They would saw into timber a foot of clean black walnut boards and have the tops, limbs and stumps left. The stump itself would sell for $5, to saw into veneers.

"What could you sell these trees for, for cash?" I asked. "I could sell them for $25 per tree, and in ten years I could sell them for $50." That would be at the rate of $10,000 per acre for the use of the land for thirty years, and the by products such as hoop timber, posts, wood, nuts, etc., would more than pay all of the cost of planting and care of the trees and interest on the investment, taxes, etc.

This seems astounding, but when you know the man who has compiled these statements, and his care not to be misleading, you can but feel that they are true. You will notice that each case referred to in this report comes from widely separated localities, and that all agree in placing the value of trees at twenty to twenty-three years old at $25.

With this fact established, I see no reason why one need to hesitate to plant a forest where the black walnut should be the leading tree for profit.

I don't for a moment suppose that every one who plants will reap such a harvest as the figures above would indicate; but if you plant wisely and cultivate well for the first five or six years, you cannot but win success. After that time you can leave the place to itself, only cut out the extra timber as it needs thinning. Leave a protecting growth of anything that wants to start along the fences, witch hazel, tagalden, anything that will help to check the force of the wind in sweeping through and carrying away the leaves.

After a few years you will be surprised to find that the native trees of the locality are coming in to fill up the ground as the others are cut out and make this a perpetual forest. If you wish you can scatter seeds of especial varieties for an undergrowth. Your larger trees will thrive all the better for this thick undergrowth on the ground, particularly if this is made up of a variety of timber.

Notice the old pine monarchs of the forest towering far above the thick timber. How they thrive.

In taking hold of this work do not start out because you think that it is the sure way to wealth but because you need the windbreaks and the protecting influence of growing trees. Do it to meet the demand for wood, stakes, posts and other timber on your farm. Do it for the love of the beautiful in your surroundings and the diversified landscape. Do it for your children and for coming generations. Do it because the future needs of your country demands it of you. I care not what your purpose may be, if you will only do it.

Since reading the above at Brantford I have received the following from Mr. A. E. Sherrington, Fruit Experimenter for the Bruce District near Georgian Bay :—

WALKERTON, Dec. 22nd, 1900.

Dear Sir: I measured those walnut trees I was speaking to you about while in Brantford, and I find them better than I thought they were. They measured 6 to 8 inches in diameter at 3 feet from the ground and they were from 60 to 70 feet high from the ground to the first limb

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and as straight as can be. They were planted 18 years ago this fall. The nuts were put in the ground where the trees were to remain. A few were transplanted and they have made the largest growth. They are planted 12x6 feet alternate in the row. There are about 300 in the lot, and the party is planting out a large block next spring.

This is a good report, showing as it does what may be expected so far north. Evidently, his trees are too near together to give them such height for the size. If he had given four times the space and had filled in with catalpas he could cut out four parts now.

CO-OPERATION IN THE SHIPMENT OF PRODUCE.

By Ernest Heaton, Toronto, Ont.

The question of the systematic marketing of our produce is perhaps the most important practical question before the people of Ontario to-day. As Mr. Dryden said last night in this hall, the export problem cannot be tackled by individuals acting separately. The only solution lies in co-operation. We have now to discuss how this can be done, but the subject is so broad that it is impossible for me to attempt to deal with it fully in the short time at my disposal.

Co-operation in the shipment of fruit at once brings to our minds the orange groves of Southern California, where, as you all know, the marketing of fruit has been developed into a science, and has been made a most remarkable success.

A few years ago I paid a visit to that country, when I had occasion to study closely the orange industry, and I could not help feeling then that, if we only gave the same care to the culture of our fruit orchards in Ontario as the people of California give to their orange groves, and if we were only half as systematic in the marketing of our fruit, we should have no cause to envy the fruit growers of the Pacific slope.

There are always two kinds of grower in every community, the people who want to sell for spot cash, and the people who prefer to consign their stuff in the hope of making a larger profit. With both of these California does better than Ontario. Here the buying of fruit has been left open to any inexperienced, irresponsible man who likes to enter into the business with the assistance of an advance from an English broker. We know the result! Dishonest packing and the discrediting of the apple business of Canada.

In California the business is almost entirely in the hands of a few large firms—like the Earl Fruit Company and Messrs. Porter Bros., and others—who have a permanent staff of experienced buyers and trained packers and who ship their fruit in their own refrigerator cars. Their brands are known all over Canada, the United States and Great Britain, and they have succeeded in pushing the sale of California fruit each year further and further afield.

But it is for their method of consigning fruit that Californians are chiefly remarkable, and it is to this that I wish particularly to draw your attention to-day.

I do not pretend to say that we could duplicate the system here, but I am quite sure that there are some of its features that could be adopted in Canada.

The growers form themselves into associations. There are local associations and a central association. The members can sell outside of their association, but if they do they are bound to pay a forfeit of ten cents per box. The local associations employ skilled hands to grade and pack the fruit, and they ship the fruit to the Central Exchange. The Central Exchange has agents at the different market centres, who telegraph market reports and receive the fruit for sale by private contract, or by auction as they deem best. When a shipment is received from the local association it is forwarded to the market which, according to tho received reports, promises best at the time. The shippers receive dividends from the central association, a portion of the proceeds of each shipment is retained. If any shipper suffers a loss from the damage of delay of fruit, all the members of the association contribute to make it good. After this sum is deducted an average is struck of the proceeds of the shipments, according to the different grades; the actual cost of the management of the Central Exchange is charged up, and a final dividend is declared at the end of the season. The Central Exchange also fulfils a useful function by buying wholesale and distributing to the local associations the material for the manufac-

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ture of the boxes for packing fruit. The popularity of this organization is constantly in creasing and to-day the fruit associations of California market thirty-five per cent. of all the citrus fruit grown in the State.

This, of course, is all very interesting, but the question that concerns us in Canada is, can we learn any useful lessons from the people of California? Is it possible to apply the principle of local associations here?

Each local association should own or lease a cold storage warehouse, packing house and evaporating plant. If a number of responsible men would club together to lease such buildings for a term of years there would be no difficulty in securing capital to erect them and the Government would help.

There are a good many people who say it is impossible, as co-operation involves an absence of jealousy, and a willingness to give as well as to take, which is generally supposed to be rare amongst us here. Our people, it is said, are not built that way. In answer to this, we may point out that there is a local fruit growers' association already existing at Burlington on co-operative lines for the exportation of fruit, and if co-operation has been successful in the manufacture of cheese, why not in the marketing of fruit? Again it is said what may succeed in established fruit districts like Burlington, cannot be successful in more scattered communities where orchards are smaller and further apart, and it would not pay to bring apples to a packing house to be graded. There is something in this objection; but it is matter of degree, and there is no reason why portable grading machines and expert packers should not be employed in the less thickly populated sections of the country.

For a central association controlled by shippers there is a great field for usefulness, even if local associations are likely to be slow in formation. Such an association would not be restricted to any particular market, and there is no reason why it should be confined to fruit. It might, with economy, embrace all kinds of produce, for the services required by the different kinds of shippers in many points identical. Its functions would be to give instructions how to prepare produce for market, to furnish to its members the latest information respecting market prices and sailing dates of ocean vessels, to arrange for railway transportation, to look after shipments at the seaboard, to control shipments so as to regulate prices by preventing a glut in any particular market, to receive produce at the port of destination for sale, either by auction or private contract, and generally to push the sale of Canadian produce, wherever a market can be found.

It must be borne in mind when we are organizing this Association that we cannot succeed in selling our fruits in the British market unless we dovetail our machinery with the established channels of trade.

Through an association of this kind special contracts could be made for the raw material to be used in the cases and wrappings used for export and special rates might be made with rail and ocean steamship lines, and pressure might be brought to bear upon the brokers in Great Britain to make a straight commission charge covering their commissions and all charges *ex quay*. This would overcome the objections that have been made to the alleged excessive charges of commission merchants.

It will be said, perhaps, that all this should be done by the Government. I do not think so. The work must be done by business men, not by politicians chosen for their party services. But Governments, like Providence, help those who help themselves. Such an association will have a potent voice in formulating the policy of the Government, or, let us say, in giving them backbone in any forward policy they may adopt, and Heaven knows! there is room for such a force. Some people imagine we have made great progress in the development of cold storage, and cold storage means a great deal to the people of this country, but if we look at Australia we can see where we stand. At present there is engaged in the Australian trade a fleet of 114 steamships fitted with mechanical refrigeration while Canada has only 23 vessels trading from Montreal, and two of the Australian vessels have more cold storage capacity than all the Canadian vessels put together. So far as cold storage is concerned, we have reason to be ashamed of ourselves. We have only tinkered with the question.

I would impress upon you, gentlemen, that it is most important that this subject should be thoroughly discussed at the present time, if there is anything at all in the suggestions that I have made; for we are as yet merely at the beginning of things. Prof. Robertson is responsible for the statement that of the twelve principal fruit products,

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wheat, living animals, dressed meat, cheese, butter, eggs, lard, raw fruit, condensed milk, potatoes, poultry and game imported by Great Britain, Canada could readily supply thirty-three per cent., whereas at the present time she only makes a paltry contribution of seven per cent. Prof. Robertson's statement means, if it means anything at all, that the only thing that prevents the quadrupling of Canadian trade with Great Britain in these articles is the want of agressive, systematic effort, and we must not forget that Great Britain is not our only market. This is the time to formulate the lines upon which our energy shall be expended. We will not build castles in the air, but I would like to point out that in some respects we are the most favored people upon earth. Not only are we by virtue of our geographical position in the very centre of the British Empire, but like the chosen people of old we have, too, our Balaams who come to curse and remain to bless. There was a time when the young men of this country went whining after the United States. They could hear nothing but the eagle's scream. They did not see the opportunities that lay before their eyes, and they forgot that God had placed them in this country to develop its resources. At that time President McKinley thought that he could clinch matters, and with a hostile tariff bring the people of Canada to their knees, to become hewers of wood and drawers of water for the United States. He did not know the stuff we are made of. He put us upon our mettle. With our backs to the wall, we set to work at once to find independent markets for our products and manufactures, and we set to work to perfect the machinery of our export trade, with the result that we are now upon our feet. The scales have fallen from our eyes. We know that we can be independent of the United States, and we know that our young men can find at home all the fortune that they want, for all we have to do to obtain riches, is to develop the potential wealth that lies at our feet. There was a time when England did not recognize the duties that she owed to her brothers in the Empire, when no difference was made by the masses of the English people between Canadians and the citizens of the United States, when they all were called Americans, and in the wider name Canadians were lost from sight. It was Paul Kruger who changed all that. The tumult and cheers which within the last few weeks have greeted our Canadian boys in the leading cities of Great Britain are a sign of the change of the attitude of English people towards Canada. These cheers have their counterpart in the world of business. To-day the business men in England are only too anxious to assist the Canadian peeple in developing trade within the empire. If sentiment goes for anything, the trend of trade and of capital from Great Britain will be to Canada in preference to the United States.

We must not neglect any market, but now is our opportunity to develope our Imperial trade. It rests with the practical business men of Canada to accomplish this by an aggressive system of co-operation in the development of Canadian trade throughout the British Empire.

Now gentlemen, I believe it is somewhat of a departure for this Association to speak on matters of this kind. I have always understood that the work of your convention was chiefly in the direction of protection or defence against bugs and against winds. I may be mistaken in this, but I would like to see this very important question fairly taken up by this Association, and I would like to see you take the first step to put into practical form the suggestions I have made to-day (Applause).

Mr. Whitney (Iroquois): Ever since coming to this meeting the subject of that paper has been upon my mind. We have heard two great difficulties spoken of—the correct method of packing fruit, honest packing, and the transportation question. I believe the suggestions as to the methods in vogue in California will solve the difficulty. It was my pleasure during the last Spring to spend some months there and I studied this question very closely, and the system practised in California met with my great approval, and I am glad to say that one part of our Dominion has already adopted it. British Columbia has the system in force to-day, and they are not behind the other parts of the Dominion in fruit raising. The only difficulty that I see in co-operative fruit selling is in regard to the different kinds of fruit that we would have to take to this exchange. We have winter fruit and summer fruit, and perhaps half-a-dozen kinds might be taken to the exchange in one week, to be packed and shipped. If that difficulty can be overcome I think there would be no other. These exchanges command to the respect of all the growers. Every grower feels that he is being honestly treated, and without this confidence it would be impossible to carry it out. The method in operation in California is something like this:

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When the shipping and exchange managers hear that there is a chance for the shipment of a car or several cars of fruit, say oranges or lemons, they apportion this carload among all their patrons who are the growers. I have a brother-in-law there engaged in fruit raising. Once he received notice that he would be required to send in 50 boxes on a certain date. He prepared himself to do so, took the 50 boxes just as they were picked from the trees without any culling, simply put them in loosely in the boxes. and drove over to the exchange They passed through a gentle inclined plane, and on each side of the fruit as it goes through there are revolving brushes that brush every partical of dust or dirt from the fruit. They pass all through another inclined plane, and girls stand on each side and make a selection, culling as the fruit passes along. Of course there might be more danger of bruising apples than oranges. They take out the very largest fruit and put it to one side as being of very little value. They take a uniform good-sized navel orange as their No. 1, and if there are no small ones they are selected and passed through another shute, and thus when they get to the other end they are all ready, uniform in size, and these are hurriedly packed in paper, and they know just how many oranges of a standard size will fill their box. These boxes are immediatly taken and put in refrigerator cars, thus obviating the necessety of cold storage. In Grimsby or in my own home we would not need refrigerators locally if this system was carried out, because the fruit will be placed at once upon the cars, and shipped at once to the proper destination already bargained for. All the people throughout Ontario know what it means to co-operate in the matter of the cheese and butter industry, and we have not to educate them up to the advantages of co-operation. All we need is some action on the part of the leading fruit growers or business men to set this movement going, and I believe we must and will come to it. Our present system is very antiquated and cannot stand.

COLD STORAGE FOR FRUIT AND OTHER PRODUCTIONS.

By Hon. F. R. Latchford, Commissioner of Public Works.

It may be expected that, after the somewhat depreciatory remarks of Mr. Heaton concerning politicians, I should premise my observations with an apology. I do not, however, intend to do so, because I do not think I am one of those who, after entering public life, cease by that fact to take interest in the general welfare. Such men are, I believe, not numerous in this Province. There are few who do not realize that additional duties are cast upon them when they are called from private life to a public position, and will not accordingly interest themselves all the more in everything that makes for the welfare of the people. (Hear, hear). That at least is my view. Accordingly, although I happen to be in the field of politics, I shall not make any apology on that account. The subject, stated on the programme is not quite that on which I thought to address you. It is true indeed that when invited, I said I would attempt to speak to you on cold storage, but I should prefer to speak of cold storage not as applied generally, but with special reference to the storage and transportation of tender fruits. There are many fruits that can be preserved and stored without what is known as cold storage, though I think that even hardy apples and pears could be improved by receiving considerably better attention during the shipment to the Old Country than they now receive. An instance was brought to my knowledge when in Montreal some time ago, wherein a large cargo of apples consigned to England had been heaped up in the warmest part of the vessel. The result was that the apples were almost completely destroyed. Now, attention should be paid to the requirements of trade by the steamship companies, so that such accidents—if accidents they can be called—should not occur.

I shall endeavor simply to deal with cold storage and transportation only, because the necessity for a proper and improved cold storage is all the greater according as the fruit becomes more perishable. The subject is not altogether a new one. I recollect reading in your very valuable report what was said by Prof. Saunders at Whitby in 1896, and it was evident that at that time he was saying all that could then be said about the cold storage and transportation of tender fruits. You will remember that he told you a large shipment of fruit had been made in cold storage in 1886 to the Indian and Colonial Exhibition at London, that they arrived in excellent condition, and that

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some 2500 plates of our magnificent fruits were displayed, to the admiration of the English people. Up to the time he spoke, in an interval of ten years, the success of that shipment has not been repeated. Why it had not been repeated someone responsible must answer; the fact remains. Now, that shipment was made in compartments fitted up under Sir John Carling on two vessels sailing from the port of Montreal. It was my good fortune to have some acquaintance with the method under which those fruits were sent over, and since that time I have taken—though occupied in a profession which did not deal directly with this matter—a very deep interest indeed in the subject of cold storage. I am a fruit grower and a flower grower in a small way, and I have always had a deep love both for fruit and flowers, and as a matter which in my opinion may materially improve the conditions of a large portion of the people, I have a deep and abiding interest in the subject of cold storage. I believe that to the fruit growers of this country there is no subject of greater importance. Perhaps there is no subject on which enlightenment is more required. Since Prof. Saunders delivered his address, there has been a number of experiments. I have seen some of those experiments conducted in buildings which violated every principle of right construction. To give you a demonstration of the reason those experiments failed, I have brought with me and now exhibit to you a piece of decayed wood, and which was till it came into my possession a little over a year ago, part of the lining of a building constructed for the preservation of perishable products, a building erected at the Central Experimental Farm, Ottawa, where the highest scientific knowledge would be, one would think, available. The sample produced is no worse than was the greater part of the interior lining of this cold storage building. There is not the slightest doubt that this piece of board was, when it was put into that building perfectly sound. Now let me ask you a question. If a cold storage building can rot a pine board in a few years is it not perfectly obvious that such a building could not preserve tender or any other kind of fruits from decay? Decay is always with us. It is indeed but a process in the work of nature. We are striving to produce a somewhat different thing from that produced by nature when we raise such fruit as this which I hold in my hand (holding up a large apple). Nature's effort is directed not to the production of the envelope which we use, but to the production of the seed within. You well know that in its original condition the apple was little more than a mass of seed with a bright attractive covering which a bird or animal would seize upon and carry away and thereby disseminate the seed. The covering was useless after the seed matured except for the purpose of dissemination. Nature having perfected the seed proceeds by means of decay to set the seed free, so that the decay of fruit is, so to speak, a perfectly natural process, directed no doubt in many cases not only to preparing the means of dissemination, but also to providing a medium in which the seed can find some nourishment during the earlier stages of its development. While decay is a natural process, and it is not possible in many cases to prevent it wholly, we may be able to retard it, and we shall do that the more easily if we know the causes of decay. The causes of decay and decomposition in animal tissues have been very extensively studied, especially during recent years, and the revelations which that study has brought forth have wonderfully ameliorated the conditions of the human race. We all know why of old a slight surgical operation brought on great suffering and often death. To day, as the records of the recent war show, exceedingly severe wounds can be treated with success. This happy result has been brought about by the study of the causes of decomposition in animal tissues. We now know that in the air surrounding us there are at all times present the germs of organisms which assist in the process of decay, which cause decay. Speaking generally—and I do not wish to deliver an academic discourse on this subject—they may be reduced to three classes: the molds, with which you are all familiar; the yeasts, with some of which you are familiar; and bacteria. They are always with us and all three play an important part in the decomposition of fruit. Pasteur took a bunch of ripe grapes and by cultivating the yeast spores present upon it found that they produced ten or twelve different species. The germs of the molds are constantly in the air. You have only to expose a sliced apple in this room for a short time, in a high temperature and a little moister air, and you will see a large crop of molds rapidly developed on the surface. Now we have also the bacteria about which we hear so much in the latter days. Many of these are well known to be beneficial, but some play an active part in decomposing fruit. As soon as you bruise a fruit you first of all rupture the cells of which that fruit is made up—these little globules of protoplasm

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surrounded by a substance called cellulose—each holding its own little life, so to speak. When you rupture the cell you destroy the power of resistance which the cells had when perfect, and prepare a soil on which the ever present spores of molds and yeasts can grow, and bacteria increase and multiply in their own extraordinary way. But for these agencies of decomposition living tissues would not decay. In high altitudes where the air is dry, it has been found that there are few if any bacteria, few if any molds or yeasts present in the air. In Colorado for instance, you can expose meat in the open air, even at high temperatures, for a considerable period and it will not be tainted; you can expose fruit and no molds will grow upon them, no yeast will develop; the fruit will simply part with its moisture, owing to the dryness of the air, and become dessicated, as it is called, or dried up. Now, it has been established that the spores of yeasts and molds cannot develop below a temperature of 35 or 40 degrees. They cannot grow at low temperatures. Nor can bacteria multiply, though the low temperature will not kill them. They will be present; they are as I have said, always with us, and the only effect of a low temperature is to retard their development. The reason then, that a low temperature preserves fruit and other perishable products, is simply that it does not permit of the development of germs.

In producing low temperatures different means are employed. I do not intend to say much of the methods and systems employed to produce low temperatures. They are of many forms, and a great degree of mechanical perfection has been attained in many of them, and the highest scientific attainments have been directed to the production of low temperatures at comparatively small cost. What has received least attention is the application of the low temperatures so produced to the preserving of perishable products. The application has been least scientifically made where it should be made most scientifically. Not many months ago I saw in a ship in the port of Montreal, a compartment intended for the transportation of tender fruits. I could only compare it, as to fitness for such a purpose, to the ice hut of an Eskimo. You had cold all around the sides of that chamber and at the top, and there the system advertised as perfect began and ended. The one consideration thought of was the production of low temperature, and that I must say was attained in a remarkable way; but the fact that your shipments of fruit in such compartments have not been successful, of itself demonstrates that there was something wrong. Nor have the shipments of meat from Australia or New Zealand been very much better. It is frozen there in large quantities and sent frozen to England where it is defrosted and sold at a profit, but yet at a low price as compared with English mutton. There is a reason for this. I am not going to cite the opinion of an English grazier or an English butcher in regard to this meat, but I will give you a statement of the Agent General of New Zealand in England in an official report to his Government. This report is published in the New Zealand Journal of 1898, in the Appendix on page 17. After referring to the excellent quality of New Zealand mutton at the place of origin he says:—"I have eaten Merino mutton here (in London) which has been about as agreeable as a slice of red pine wood, the color of which it somewhat resembles." So that the shipment of frozen meat has not been a bewildering success, although so great is the demand for meat in the English market, and so cheaply can New Zealand mutton be sent there, and so cheaply can it be sold at a profit, that the poorer people buy it very largely. But still the meat does not arrive there in nearly as good a condition as I believe I can show you is possible.

In connection with cold storage, we can, I think, take a lesson from the men who have been studying bacteriology, from Pasteur down to the present time. Pasteur has shown that the most putrescent liquid will not decompose at all if sterilized in the first instance and afterward exposed only to pure air. When a bacteriologist wishes to procure a volume of pure air, the first thing he does is to filter the air at hand in such a way that all germs shall be eliminated from it. Is any such process open to us? Can we exclude from the chamber in which we are carrying fruit susceptible to these destructive agencies, or eliminate from the air within such a chamber these agents of decay? Now I answer that there are such means, and assert that they have not received proper attention, and as a consequence the shipments of quickly perishable fruit have not been a success.

Before referring to such means let me say that in the first place *cold storage must be economical*. If the cold storage does not cost you less than you get in the increased

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value of your fruit it is of no advantage to you. You must have economical cold storage; storage that is cheap to construct and cheap to maintain. About insulation I will not speak more than to say that there you have the chief cost. The more money you expend properly on insulation, the better will be the result, but there is a way of securing good insulation cheaply, and that the Government of which I am a member has set before you in a pamphlet recently issued. The best medium of insulation is still or dead air. It is a difficult thing to obtain and keep, yet it can be obtained and kept, and it may be obtained and kept cheaply. The external air is usually of a much higher temperature than that at which you wish to carry your products. Now two proximate bodies, no matter what their temperatures are, are constantly exchanging heat. Ice itself has heat; it is not cold except by comparison with substances of higher temperature, we cannot get down to the degree of absolute cold with ice or even with refrigerating pipes There is a certain elevation of temperature which they have above the point of absolute cold, and there is an exchange of temperature between the ice or other cooling body and the air outside. You are constantly losing by radiation and absorption of heat. There is a loss to the body of higher temperature outside. Insulation is necessary to prevent such loss, and as an inch of still air conducts heat about five times less than pine of the same thickness, still air should be used as a medium of insulation wherever possible. The plans when submitted provide for this. The sawdust filling shown is not as good a non-conductor as the air whose place it in part occupies, but its presence is necessary to keeping the air in its interstices still. The insulation you will notice does not immediately cover the ice, but is placed over the ceiling above the ice, in order that the ice itself shall be exposed for a purpose which I shall presently mention. There will be no greater loss by absorption than if the ice were immediately covered by the sawdust or some other good insulant while there will be an advantage which cannot be otherwise obtained.

Your structure must not only be cheap to construct but also cheap to maintain. You will remember that in old days when we were heating our houses more generally by means of hot-air furnaces than we are now, we took the air from outside the building, and had to heat it often from below zero up to say 70 deg., requiring necessarily a large expenditure of fuel. Today under the same system we take the air to be heated within our houses at say 50 deg, and have to heat it up through 20 deg., only, instead of through upward of 70°. A great saving of fuel is thereby attained. Now if you can get your air for cold storage purposes at pretty near the temperature you need and have to cool it only through say 10 deg., there will be a great economy in cost of maintaining a mechanical or chemical plant, or if you are using ice, a considerable saving of your ice. In a cold storage building recently built in a neighboring city they are now taking outside air at 60 or 70 deg.,—in summer it would be 85 or 110 deg.,—and cooling it down to 32.; that is cooling it through 30 or 40 deg. I said to the superintendent, "Why don't you take your air in this cooling chamber and use it over again?" "Oh", he said, "it is impure, we could not do that; it is smelly, and it gets moist, and we could not do it. It would destroy everything we have." Perhaps it would, with his system, but if that air could be taken at a temperature at say 40 or 45 in the upper part of the chamber, purified and reduced to 35 deg., you would have to reduce it only through 5 or 10 deg., instead of through 30° or 40° thus materially economizing the cost of maintenance. *The air can be so purified, cooled and utilized.* We cannot do better than follow nature, and avail ourselves of her forces in material things at least. Now there is a great force present always with us in refrigerator chambers and everywhere else, the force of gravitation. That force can be used to great advantage in connection with cold storage. Wherever you have cooling pipes or ice you have also absorption of heat from the air and a consequent increase in the density of the air. Air being a mixture of gases, expands like gases, when under the influence of heat and the force of air so expanding is quite powerful, and may readily be directed and utilized. The air near the ice or pipes will fall, and falling it will push through or against any less dense body of air that may be in its way. It is manifest that to obtain the full effective force of the air so falling, its path should be made easy. Every obstacle lessens that force It should be permitted to fall free, unopposed by any conflicting current. Such a current conflicting with the descending volume of cooled air may arise from the expansion of heated air which being of less specific gravity than air around it of lower temperature will rise. The downward current of cold air and the upward current of warm air must not conflict. If they should, we shall have available

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not the sum but the difference of the two forces. The difference is all that the most of the constructions at present in use have to promote circulation of air. This circulation is not to be sought as an end, but as a means to an end. Let us take the circulation which might readily be produced in this hall. The windows on my left are but slightly separated from the outer air on this winter day and the room is coldest on that side. Place on my right opposite those windows, a pair of steam radiators, and we shall have a very rapid circulation of air. The air on the window side, being colder, will fall to the floor, and flow like water across the floor from left to right, simultaneously the air over the radiators will expand and rise to the ceiling, and flow across it towards the windows.

If the windows extended along the whole of the left side of the hall and the radiators along the whole of the opposite side, there would be an even downward flow along the whole length of the wall on the one side, and an even upward flow along the whole length of the opposite wall. The volume of air falling on the one side and the volume rising on the other would not impede each other. Each would assist the other, and you would have a very rapid circulation of air, the more rapid according as the difference in temperature was greater between the two sides of the room. This circulation would exist were all openings into the room hermetically sealed. You will see from this how a strong draught may exist in a room even though no air currents come into it from without. You would have a rapid circulation of air in a room cool on one side and warm on the other, but that circulation of itself would be of no benefit. The air, though circulating rapidly, would not lose any of the impurities with which it is charged, but it would simply tend to distribute such impurities throughout the whole of the chamber. Circulation, then, for the mere sake of circulation is of no advantage. It is, however, of the utmost importance as a means to a most desirable end. That end is the purifying of the air within the room.

The impurities consist first of all of an excess of carbonic acid gas. Ordinarily this gas forms but an infinitesimally small portion of the air, yet on it all vegetation lives. The quantity present in the air is so trifling as to be discernible only with great difficulty; as Faber has so well said, if it were breathed away, or if the sea drank it all in, or would not give back again what it drinks, in a few short hours the flowers would be lying withered on the ground, the mighty forests would curl up their myriad leaves, show their white sides and fall. There would not be a blade of grass upon the earth.

I mention this not because the presence of this gas in small quantities is injurious, but to show you on what almost imperceptible chemistries the preservation depends.

In the ripening of fruits carbonic acid gas is constantly given off. In addition to the presence of this gas, we shall have the spores of the various decomposing agents to which I have referred, and probably bacteria themselves in an active state. Then we shall have something more. Within the chamber, as soon as you store things in it, there will be produced odors, a different odor from each article. Certain products will not only give off odors but absorb them. Milk and butter are well known to be readily susceptible to odors, and in some shipments in cold storage of eggs and apples, the eggs have been found to absorb the odors of the apples, and were consequently good neither as apples nor as eggs.

You know that water has a strong affinity for odors. If you place a glass of water in a bedroom over night, it will in the morning be unfit for use. In the interval it has absorbed foul gases from the room. Such gases are always present in the air in greater or less quantities, but they may be got rid of if you can bring them into contact with a body like water having the power of absorbing them. It is remarkable that the gases of which air is chiefly composed are but very slightly absorbed by water. A given volume of water will absorb but two-hundredths of its volume of nitrogen, and but about four-hundredths of oxygen. On the other hand, water will absorb one and three-quarter parts its volume of carbonic acid gas, about four and a half parts of its volume of sulphurretted hydrogen, and more than one thousand times its volume of ammoniacal gas. If therefore you can bring the air charged with deleterious gases in contact with water, the normal constituents of the air will not be themselves absorbed, while all the injurious gases will be. This, then, is one of our problems: How can we cause the whole of the air contained in a storage chamber, charged as it is with injurious odors and gases, to come into contact with a body which will absorb such odors and gases and allow the air to pass on freed from them?

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There is another problem. In many cases the products stored contain a very large percentage of water some of which they are constantly giving up to the surrounding air. Fruits contain often as much as 90 per cent. of water; meats a lesser though still a large proportion. Moisture facilitates, as I have shown, the growth of bacteria, molds and yeasts. How shall we get rid of it? If you bring air into contact with a body of lower temperature, the moisture in the air will condense on the cooler body. This phenomenon is manifest at present on the windows of this hall. The moisture formed in large drops upon the glass has not, as you know, come from the outside. It has accumulated owing to the fact that the temperature of the glass is lower than the temperature of the air within the room. Here in the model car before you we have in the centre a body of ice, lower in temperature than the air in either end of the car. Let us now take advantage of the circulation which will result, if we permit it, from this difference in temperature. If we bring all the air in the car in contact with the ice we shall have the excess of moisture in that air condensed upon the ice. Another highly desirable result will follow. The surface of the ice is covered with water. The coat is a thin one, resulting from the melting of the ice and the condensation of the moisture in the air, but it is sufficient to absorb excesses of carbonic acid gas and other injurious gases which are present in the air, and so purify the air within the car. We could by means of fans force the air any way we please, but we have at hand ready for use the natural force of gravitation, to which I have referred, and the expansive force of vapors. Let us apply these forces rationally to the problems before us. The air in contact with the ice not only loses its moisture and its impure gases; it loses also its heat; the germs it contains are imprisoned on the liquid surface and carried off in the drip. The deeper the mass of ice through which the air falls, having regard always to the fact that its course must not be wholly obstructed, the greater will be the condensation of moisture, the more thorough will be the absorption of gases and odors, the greater the reduction of temperature, and the more complete the filtration from the air of all dust particles and germs that may be in suspension in it. If the ice chamber were closed at the bottom, the air could not pass out; it would remain in the chamber just as water would in a bucket. If you cut away the lower part of the bucket, the water will flow out, and will continue to flow if the bucket is replenished and the opening unobstructed. Here also when we make an opening in the bottom of the chamber, the air under the influence of the force of gravity will flow out into the storage chamber. It there comes under the influence of the warmer air present in the storage chamber, and the warm walls of the car or other building. It absorbs heat from its surroundings, expands and rises through the products stored in the chamber, or carried in the car or vessel. If no outlet were given it, it would simply accumulate until the pressure in the storage chamber would be equal to the pressure in the cooling chamber, when stagnation would result, with all the disadvantages which we are desirous of avoiding. If an opening is made into the ice chamber, the pressure of the expanding air in the storage chamber will be exerted in that direction, and as the air is cooled and falls away, a relative vacuum will be created in the upper part of the ice chamber which the air in the storage chamber will rush in to fill. The line followed in the storage chamber by the air in such a movement would be the old physical line of least resistance. The air flowing out at the bottom of the ice chamber would for most of its volume flow across the floor of the car to the end where, owing to the obstruction, that part of it which had not ascended under the influence of the heat it had taken up, would turn and flow back into the upper part of the ice chamber along what would be approximately a diagonal line from the lower angle of the storage chamber to the point of junction of the ice chamber and the ceiling. The air below that diagonal line would be in motion; the air above it would be almost at rest; it would be stagnant, holding all we wish to eliminate from it, and it would largely so remain. To put this part of the air in circulation, a false ceiling is placed in the car, as it may be in any storage chamber, extending from the duct leading into the ice chamber to within six or eight inches of the opposite end of the car. The air flowing into the ice chamber past one end of the false ceiling—which practically forms a duct along the whole roof of the car—induces a current of air in the duct, which gradually extending to the more distant end of the car, draws up the otherwise stagnant air. In small constructions the ceiling duct may be disregarded, but in cars and large buildings its usefulness cannot be over-estimated. By its means the air is made active throughout the whole of the storage chamber. There is rapid and thorough circulation from the

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storage chamber through the ice. The air is dried and filtered every time it passes through the ice, and moisture and odors are absorbed and pass away. It is, however, constantly receiving accessions of foulness from whatever is carried in the storage chamber. The process must therefore be continuous to be of any use, and must cleanse the whole of the air as rapidly as possible. To effect this end, the forces available must be utilized to their highest power. If you bring the downward current of cold air into an ascending current of warm air, the power available will be simply the difference between the two forces. If you make the upward current co-operate with that which flows downward you will have the sum of the two forces. Strange as it may appear, many of the systems in use do not adopt this obviously correct principle.

Where the necessity arises for placing the cooling medium above the storage chamber,—and this may often be a matter of economy—the cold air may by means of proper flues be still delivered at the floor of the storage chamber, and the heated air taken out at the highest point. In such cases it is of course absolutely necessary to thoroughly insulate the ceiling, otherwise condensation will take place there, and the collected moisture will drop back on the goods stored and soon become the breeding ground of molds and slimy organisms such as are commonly seen in most of the cold storages in this country, and in most of the refrigerator cars in use. The car or storage chamber which is moist in any part is unfit for use. It is easily possible to construct our cold storage in such a way that there shall be no moisture in any place except the ice chamber, or when mechanical or chemical cold storage is used, on the freezing pipes.

I have during the last few years looked at a good many cold storage rooms in this Province, and I have been astonished at the want of thought manifested in their construction. Perhaps I should not be surprised in view of the imperfect systems in use on our railways.

I have here a model of a car invented by a Canadian, Mr. Hanrahan, who has led the way in scientific refrigeration, and who is, I am glad to notice, present with us to-day.

The refrigerator cars in common use are not built on the plan of this model. They have tanks at the ends made usually of galvanized iron. Some have wire netting at the top and bottom so as to promote circulation through the mixture of ice and salt commonly used. It is urged on behalf of such cars as against those built like the model, that only two doors—which are points of weakness in a car,—are used instead of four; that it is easier to transfer freight from one car to another while the old style cars are just as good for refrigerating purposes. Well, just consider the facts for a moment. Suppose you have at each end of a car just the construction you have in the centre of this model. There would be a downward flow of air at both ends and the two currents would flow inward along the floor towards the middle of the car. If you had a current of water falling down at one side of this room and another at the other, they would flow along the floor towards the centre, and the effect would be seen at once. You cannot see the air, and this, while perhaps a disadvantage in studying refrigeration, is in all other respects a great blessing, as, if the air were visible, all things else could not be seen. If then water was flowing from the ends of a car towards the centre, you would observe the two currents come together, obstruct each other, accumulate, and if the two currents were equal, as they are opposite, you would have rest and not motion. That is precisely what happens in nearly all refrigerator cars. The air in contact with the tanks is chilled and falls; it flows towards the centre from both ends; the two currents meet there and while some of the air will undoubtedly rise, a large portion of it will be impeded and stagnation ensues. The effect is that in the centre of the car there is often no circulation at all with the result known to many of you who have taken the trouble to look into a shipment of tender fruit in a refrigerator car only to find that all the fruit in the centre of the car had been spoiled while that close to the tanks might be in fairly good order. In the present car the air flows downward through the ice, outward towards both ends of the car where the temperature is highest, and there is an up current of warm air which rising to the ceiling flows back into the centre of the car. You have two volumes of air rotating rapidly inward, and bringing all the air in the storage chamber constantly under the influences which I have referred to as effected by the ice. There may be slight disadvantages in maintaining a car with four openings instead of two, just as a Pullman car has disadvantages from certain points of view over the ordinary passenger car; it costs more to build

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and will carry fewer passengers, but it is built for a special purpose, and in a refrigerator car proper refrigeration should be the first consideration.

If you have good refrigerator cars you will not need to cool your fruit before shipment. The reason is obvious. How will you cool your fruit in the first place? You answer, by cold storage. But it is just as easy to have proper cold storage on wheels in the form of a car as to have it stationary in the form of your Grimsby building. If you have a proper car your fruit will be transported in good order to Winnipeg or the seaboard in the same time you now waste in cooling it in your stationary cold storages at Grimsby.

With proper care you can load all fruit as soon as it is picked. It may happen that it is not possible to get a car load at one time or place, or even the half of such a car as I now show you, and that storage will be required to keep the fruit until you obtain a sufficient quantity for shipment. The best way to attain this end is undoubtedly by such co-operation as Mr. Heaton referred to in his opening remarks, but as necessary preliminaries you must have those varieties of fruit which the consumer most desires, and you must injure them but as little as possible in picking, assorting and packing. Any injury to the fruit simply provides a soil on which the everpresent agencies of decay will grow and thrive.

What is the best packing and package for cold storage is largely a question of experiment. I hope a great deal of attention will be paid in the near future to experiments, to determine just what is the best way in which to pack fruit. I may tell you that theoretically, and not speaking from any practical experience, fruit should have a packing medium only sufficient to prevent it from being injured by or injuring another fruit. The packing should be porous, otherwise it will not permit the escape of gases which are generated in the fruit, and which are, I think, injurious to it and hasten decay. Your package for cold storage should be a package which will permit a circulation of air all through it. That is theoretical too, but I think experiments will prove the correctness of my statement. There is a disadvantage, however, about ventilated packages that I wish to call your attention to. It is that when the fruit is taken out of cold storage in a ventilated package and exposed to the ordinary air, the moisture in the air is condensed and remains upon the fruit. As the chilled air falls away, it is replaced by volume after volume of warmer air which also leaves its deposit of moisture and passes away, and the process of deposition goes on until the fruit attains the same temperature as the air. The consequence is that if you take an open package of fruit out of cold storage and expose it to the air it becomes in a very short time quite wet. Now, that is not from within the fruit; it is wholly from without, wholly a deposit of the moisture contained in the atmosphere, so that theoretically, and practically too—because it has been demonstrated—while fruit should have a ventilated package while in cold storage, it should, when brought out of cold storage, be placed in slide-closed packages, or by being placed in another box so that the increase in temperature of the fruit should come to it by absorption of heat through the box and not by direct contact with the air. Outside air at say 80 degrees will soon communicate its heat to the fruit, and the fruit may then be exposed and it cannot condense any moisture; it will be and remain perfectly dry. If you then have ventilated packages for cold storage you should either be able to close them when you take them out, or put them in closed receptacles until the fruit attains the same temperature as the air in which you desire to expose the fruit for sale.

Then, as I have said, you will require to co-operate one with another, and I know, speaking for the Government of the Province, that you will have its hearty co-operation, and, I believe, the co-operation of the Government at Ottawa. Then perhaps the two governments could co-operate, each helping in its own sphere the people as best it can. Last year we passed an Act at Toronto to assist any one or any body of men who wished to erect cold storages to the extent of one-fifth of their outlay up to $2,500. That is some help, and we hope it will prove an incentive to cold storage.

The necessity of providing better transportation facilities should be brought strongly to the attention of the railway and steamship companies and the Ottawa Government, which is charged with trade and such matters. The whole chain of cold storage should be complete, from the grower with his cold storage at the point of production, through the car to the port of shipment, on the ocean and at points of distribution to consumers. Now two of those links are in charge of the Dominion Government—not wholly, because that government itself is dependent upon the car companies. If you are convinced that

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one car is better than another, then you should insist upon the railway companies providing that car. That is a matter of experiment with you. An old car with imperfect insulation has been constructed on the system which we think is a good one, and you can experiment with that car. It is not as good as it could be because the insulation of the car is not good, and unless you have good insulation your ice is going to waste away quickly. On shipboard the whole system must be changed. The system has been altered to some extent. You have not been told about it, and perhaps may not be, but the system was materially changed after the Hon. Mr. Dryden made a shipment to the Old Country. I told you of a ship in which I saw what should be called the Eskimo system adopted, which had exposed pipes all around the sides and on the ceiling. It operates much as an Eskimo igloo would. All the moisture contained in the air is condensed on the sides and ceiling. If they are very cold of course it is frozen there; if they are below 32°, as frequently happens, any moisture condensed drops back on the goods intended to be carried safely, and I have seen it so drop back in the port of Montreal. After the success of the trial shipment to which I have referred the ceiling pipes were cut off on the "Manchester Commerce"; no cold brine was allowed to circulate in such pipes and air ducts were formed by sheeting in the pipes on four sides of that chamber from near the floor to near the ceiling. The result was that there was a circulation near the walls and stagnation in the centre. Better results followed, but not nearly as good as if all the pipes had been combined and placed in a coil on one side of the room, separated from the storage proper by an insulated partition, not extending quite to the floor or ceiling and with a proper duct along the whole ceiling. You would then have considerable difference of temperature between one side of the room and the other, the circulation would be unimpeded and rapid and you would have the other results that I have mentioned.

I have occupied a great deal too much of your attention to-day. (Voices: "No, go on.") But I feel the seriousness and importance of the subject, and speaking as I do disconnectedly and without much order I fear I am becoming wearisome to you.

I might speak about the advantages which would come to us from an increase in our fruit trade. They have been dealt with and well dealt with here to-day, and I shall leave them to your consideration. I hope, however, that with the increased interest in cold storage, and the more scientific attention devoted to it, we shall soon be enabled to increase many fold our trade with the Old Land. There is a great market there, and with proper cold storage we can send to it our surplus product and receive a large return which is now lost to us. The greater the advantage to our people, the more will they be inclined to live in this bountiful and beautiful land. We have here, not only in this vicinity but throughout the whole of this province, large areas of excellent land which could be devoted to fruit culture, and which are not now devoted to it because the return is not what it might be. I look forward with confidence to a process of development of this country, of expansion in many lines, and especially in the production of fruit.

The Governments at Ottawa and Toronto are, I am sure, anxious to do everything that is possible to advance your interests. It has been stated here to-day that fruit growers must help themselves. That, I think, is the proper spirit, and governments, like Providence, are disposed to help those who so act. Speaking merely for the Government at Toronto, though I feel that I might give you a similar assurance on the part of the Government at Ottawa, I wish to say in conclusion that the fruit growers have our hearty sympathy, and will have our encouragement and assistance whenever and wherever possible.

AN EXPERT ON COLD STORAGE.

By Mr. J. F. Hanrahan, Ottawa

When I came here to-day I did not expect to be called upon to say anything in connection with cold storage, but since taking hold of the cold storage for the Ontario Government I think I could give you a little practical information. When you are undertaking cold storage you must remember it is necessary to have everything completed in its entirety—just as it takes a hundred cents to make a dollar; ninety nine cents do not make a dollar. I have a question which I have submitted to Hon. Mr. Dryden Hon.

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Mr. Latchford, Dr. Mills, and the principal professors, and that question is this: Are the carbonic acid and other gases which are generated from fruit during the process reaching to a stage of putrefaction, beneficial or detrimental to that fruit? That is one of the questions I want to solve. Dr. Mills stated kindly to me that he was going to have Prof. Shuttleworth and Prof. Hutt solve the problem, and from what I understood I think we will soon have a definition of it. The next thing is this: In the *Globe* this morning I noticed that Dr. Saunders said yesterday that packing presented a problem that was not yet solved. Now, gentlemen, I have never taken any interest in fruit; my whole mind has been concentrated on cold storage. I have delved right down into its depths, and I conceived an idea, and I made a construction in accordance with that idea, and with that construction I made a test, and from that test I got a result; and if you get a result there is a cause for it. Why has this problem not been solved? You see that Dr. Saunders says that packing presented a problem that was not yet solved. How are we going to discover what is the most practicable method for carrying perishable goods to Europe in the best condition? That is one of the cents that goes to make the dollar. First you have to get a perfect system of cold storage—never mind mine, get the best. In the next place have the temperature of air in one chamber 35 deg., in another 40, in another 45, in another 50, and in another 55, if you want to ship different varieties of fruit as they come into season. Then at different stages of maturity, place some in deep packages, some in shallow packages, some in open packages, some in closed packages, some wholly wrapped in paper, some partially wrapped in paper, some with wool, and some with excelsior or any other means. In my estimation the whole system of handling fruit to-day is as crude as it was twenty years ago. By this experiment you will find out what is the greatest possible length of time that fruit will carry. I may say so far as that little system of mine is concerned, there is nothing like it on top of earth, because the ice is supplied in the construction so that we get the circulation by the unification of two pressures, of two extremes. Unless extremes exist, circulation cannot take place. I want to say here that I am not in politics, but the fruit growers of Ontario are under a deep debt of gratitude to the Hon. Jno. Dryden for the efforts he has made in their interests in relation to cold storage, and I know it—(Hear, hear, and applause) —and also to the Hon. F. R. Latchford. I want to say right here, I am not after this position just for the money that is in it, but honor to whom honor is due, and I know where Mr. Dryden antagonized some of the wealthiest men in this country in the interests of the fruit growers (hear, hear). I was requested to go down to Montreal and examine the cold storage on the "Manchester Commerce." There was a series of pipes all under the four walls and on the floor and ceiling. I came in the door, took a look around the chamber, Mr. Blue of the Manchester Ship Canal Company was there, and he said, "What do you think of this?" I said, "You can't get any circulation in this chamber." "Oh yes," he said "we can." I said, "I beg your pardon, that is an utter impossibility." So he wanted me to explain, and in the meantime he came out and took out a paper, like a lot of other people that think because they understand business that they understand what cold storage is. Well, they have got to take off their coats and discover it. I said to him, "Look here, do you see that building? Well, you might as well take that building and carry it on your shoulders as expect to get circulation in this chamber." The chief engineer was in and heard me make the remark, and he said, "Mr. Hanrahan you are right, if that door is closed there is no circulation after one hour." I said, "I thank you for your kindness in making the admission, but it isn't necessary for you to do it in order for me to know it." (Laughter.) Then I went to work and put up the construction. The idea of my construction is this, that the odors, moisture and gases must be forced out of the atmosphere so as to purify that atmosphere before it returns to the refrigerating chamber again. Although much has been said about the chain of cold storage and the results at the Paris Exposition, I could tell you some things that would surprise you about the consignment of fruits that were landed in Paris for exhibition. The absurdity of anyone trying to make you believe they have got the best chain of cold storage in the world. It is no better than they have any where else, in regard to the application of the cold. The means of the reduction of the temperature of the atmosphere is just the same. I want to tell you I was handicapped in the construction I put in the "Manchester Trader" because I had only so long to put it up, and I am sorry the construction cost as much money as it did; but necessity knows no law, the fruits were on the way, I had to

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get the construction put in, and it could not be done in Montreal in a minute. However, I did the best I could. I wanted to get the pipes placed so that each row of pipes would not be in an angling position, because air, like water, flows in the line of least resistance. I was obliged to go to work and make the plates of wood; I should have had them of iron. The construction was crude, but the system is all right. I was in Ottawa when I heard the "Manchester Commerce" had arrived in Montreal, and I went down and saw a gentleman who is closely allied with the party connected with the scheme of cold storage that has given such wonderful results, and I said to him, "I must go down and see the 'Manchester Commerce.'" "No," he says, she is loaded up and gone." But what did I find when I examined this cold storage, at the request of Mr. Dryden? The pipes were all exposed around the walls, and on the ceiling there was your condensing surface without the elimination of the odors, moistures and gases of the air. When I went back I found the whole of the walls covered with a sheeting of lumber in trying to use my ideas. The pipes were 2½ inches in diameter; the space between the wall and the interior surface was about ten inches, and there were 7½ inches on the sides by which the air could flow back to the chamber in the same manner as it left it That is not all; they left a 10 inch flow at the bottom, and a 10 inch return at the top making a 10 inch outlet from the space where it was reduced; then they go to work and put a one inch pipe across with tight packages placed on top, thus only leaving about a one inch communication between the chamber thus forming it and the chamber where the products were placed

In my opinion, it is important to get the odors, moisture and gases from the product as quickly as generated, while being carried in cold storage; but that cannot be done with a tight package. There must be a direct communication between each individual piece of fruit and the air.

Rev. Mr. BALL: It should not be wrapped.

Mr. HANRAHAN: That question is not yet solved. If the gases and odors generated from fruit during the process of putrefaction are detrimental to them, and you take each individual piece of fruit and not only wrap it in a piece of paper, but twist it up so as to hold the gases and then put it in a package such as shown here with a series of cells, the consequence will be that each piece of fruit will be submerged in its own gases. I have been working on this thing for quite a little while, and am working on it for pure satisfaction to show that the Hanrahan system has no equal. I am utilizing nature as far as it lies in my power, that is, the natural law that you can get circulation by pressure alone, or by suction alone, and that by the combination of pressure and suction, you utilise all nature's forces. If the fruit growers will do their part I will guarantee to do mine. Here is a package I have worked out in which, when the fruit is packed and the cover fastened on, there is a direct communication between every individual piece of fruit in the package and the external air, so as to allow the odors and gases being carried off with any surplus moisture the fruit may possess. When the packages are placed in the cold air, owing to the extreme warm air and the condensing surface, the air is colder than the surrounding atmosphere. You close the slides and it becomes a sealed package, and then you raise the temperature of the product by radiation rather than by the air coming in contact with it and condensing moisture on the surface of the product. I do not say this is perfect yet, but it is a stride towards it. I would like to see that problem solved. You can never get it solved on the lines you are now working on. You have yet to discover what is the most perfect way for packing. (Applause).

Mr. McNEILL: I understand there is no communication between this car and the outside air.

Mr. HANRAHAN: No. The moment yon form a communication between the external and the internal airs the principle will be just the same as if we were trying to heat this room and you open your windows on a cold day.

It is only owing to the extremes between two temperatures that proper circulation can be kept up, and the greater the extremes that exist between the two bodies the more rapid will be the circulation of the air. I take the ice tank and place it in the centre. Each end of the car is naturally a little warmer than the centre, because the intensity of the cold is the intense cold of the ice. Now, cold air descends and flows to the line of least resistance; hot air ascends according to natural law, and as the hot air ascends it carries off the odors, gases and moistures, and as the cold air descends in the

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ice chamber it creates a suction as the hot air ascends with the moistures, odors and gases and the cold air returns purified from the refrigerating chamber.

Mr. E. D. SMITH: Do you not think that pipes filled with ice on the side of the room would answer the same purpose?

Mr. HANRAHAN: You have not a set of them in Ontario that is right to-day. Now it is a very strange thing to think of it—there are only eight degrees of extremes existing there. Say the temperature of that ice is 32 degrees, say the temperature of the chamber is 42 degrees; you can understand how sensitive it is, owing to the unification of those two pressures. If you take care of the atmosphere that surrounds the product, the product will take care of itself. Why is it that putrefaction does not set in? It is owing to the absence of odors, moisture and gases.

There is another question in reference to taking your fruits on board ship that is worthy of your most serious consideration, and that is in reference to the size of packages. You ought to have a standard size package. If you want a half bushel package, make it the same width and length of the bushel package and half the depth so as to lay right over the other one. When you want to make a quarter package, make it the same length, half the width, and the same height as the half bushel package—that gives you a peck. There should be on one side of each package a strip, and they ought to be kept apart. I had great trouble last summer with the shipment at Montreal on account of the various sizes of packages. Another thing that came before me, and that I had a little row about in Montreal was the rough way in which the packages of fruit was handled. Somebody is to blame and the fruit growers should adopt the proper means for the handling of their fruits. The limit for the carrying of some fruit is say five days. Well, what will be the consequence if you carry it six? Supposing the greatest length of time a certain kind of fruit can be carried under the most favorable conditions is ten days, then do not try to carry it eleven.

Mr. CASTON: How much ice does that car take?

Mr. HANRAHAN: I do not know in regard to the consumption of ice in that car I fitted up in Montreal. It was G. T. R. insulation, but it was the Wick system, Mr. Dryden had quite a fight to get the work done. I will build a thousand of those cars and put in say four tons of ice in each, and, if the fruit is packed in any kind of reasonable weather, I will guarantee to run those cars five days without re icing.

The SECRETARY: Should that ice chamber be completely filled?

Mr. HANRAHAN: It depends upon the distance you want to carry it. Another point Hon. Mr. Latchford made was a very good one, about cooling the fruit on board the car. I have seen an absurdity in pamphlets and bulletins on cold storage about chilling your fruit before you ship it. The longer you hold it in cold storage before shipping the longer you are from getting it to the market, and the greater the detriment to your fruit before you get it into the market.

E. D. SMITH: You cannot bring the temperature of fruit down to 35 or 40 degrees with that car.

Mr. HANRAHAN: It is not a question of temperature at all; it is a question of eliminating the odors, moisture and gases from the air; the consequence is that the temperature is gradually going down.

Mr. E. D. SMITH: It is too gradual, that is the trouble.

Mr. HANRAHAN: Oh, no; if you will only get those problems solved—find out the proper method of packing fruits, and also find out whether carbonic acid gas or other gases are beneficial or detrimental to fruit, I will take care of the cold storage.

Mr. MCNEILL: We find when we put our fruit in a car at once when the temperature is about 90 degrees that we have to use from two to three tons of ice in order to cool the car down, then we re-ice it before we send it and it is all right.

Mr. HANRAHAN: You will have to do that under any conditions. You get right back to the old point that you cannot get something out of nothing; it does not matter where you get it, you have to pay so much for getting it.

Mr. MCKINNON: I think there is one little practical difficulty that Mr. Hanrahan does not understand, not being a fruit grower. It is this, that we cannot pick all our fruit to fill the car in one day and put it on board the car at once and send it away. It takes three or four days for us to fill a car, sometimes a week, with that selected fruit which it is necessary to send to England which requires such careful packing, although

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we can easily fill a car of ordinary fruit in one day. Now, we cannot always depend upon the car being there just when we want it. That is the first difficulty. The second is that if the car is there we have to pay a pretty high sum for the delay of the car for a whole week; so that in practice it is well to have a cooling chamber at the point of shipment, or what is very much better, at the point of packing. I think it is better that the fruit should be chilled to a certain degree before it is even packed. I think that it packs with much less risk of damage if it is chilled a little before packing, and then having been chilled properly I quite agree with Mr. Hanrahan that then it may be put on his car without any cold storage at the point of shipment.

Mr. A. H. PETTIT: It is a large expense to build cold storages all over the country, and it would pay those sections where the fruit was being shipped to pay the charges on a car standing if it could be secured for that locality; it would be cheaper than cold storage.

Mr. McKINNON: I doubt if it would; it would not be so certain.

Mr. A. H. PETTIT: I hope we won't be bothered in future as we were this year by having a properly fitted steamer only once in three or four weeks.

Mr. HANRAHAN: That shows the necessity of having such a steamer once a week.

Mr. A. H. PETTIT: It appears that this gentleman has spent a lifetime in developing this very valuable improvement in the cold storage system, and I move a most hearty vote of thanks to Mr. Hanrahan for his most excellent services along the line of cold storage, particularly for his able services in this line in the horticultural interests of the country.

Rev. Mr. ANDREWS seconded the motion, which was carried unanimously amid applause, and tendered to Mr. Hanrahan, who in reply said: "I will promise you that if you people will do your part I will do mine." (Hear, hear.)

ADDRESS BY MR. J. F. CLARKE, PRINCE EDWARD ISLAND.

In regard to our varieties of fruit, I may say Alexander and Duchess of Oldenburg have made an excellent success in Prince Edward Island. I spent four years in the Annapolis Valley and enjoyed being there very much, and got pretty well acquainted with fruit and fruit men there, and I felt that Prince Edward Island was not doing enough in fruit growing, and on my return I talked to the farmers there. There were fruit growers in Prince Edward Island long before I was born, and one gentleman, Mr. Cairns, came there from Scotland about 80 years ago, and you will sometimes hear of the Cairns apple, which he brought from Scotland. It is a very good apple, and looks something like the Ben Davis. There is something about your fruit here that I notice that I do not know how to describe; it is smoother and rounder than our fruit. We grow the Ben Davis, but it is very oblong in shape; here you have them comparatively round, and the ribs don't show up in your Tallman Sweets. Your Mann looks like what we call the French Pippin.

REPORT OF COMMITTEE ON SAN JOSE SCALE.

In the opinion of your committee, a serious mistake was made by the large number of owners of infested orchards who offered determined opposition to the carrying out of the original intention of the act, and that if public opinion had supported the Minister in his efforts the scale to-day would be almost if not entirely exterminated. We desire also to place on record our appreciation of the efforts of Hon. John Dryden in behalf of the fruit industry of this Province. We would now recommend:

1. That a system of inspection be carried on in all suspected districts, with a limited number of suitable assistants.

2. That every grower in suspected districts be required to inspect his own trees during the months of November and December in each year, and to report to the inspector

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not later than the 1st day of January following, on suitable blank forms to be furnished, that the work had been carefully performed, together with a statement of the condition of the orchard at the time of inspection.

3. That, as the work of treatment is still in an experimental stage, the Government should make suitable material, both whale-oil soap and crude petroleum, available to the people on the same terms as supplied to growers last year.

4. That in isolated sections where the scale is found to a very limited extent, the treatment of the trees be carried on by and at the expense of the Government, under the direction of the inspector.

5. That, with regard to nursery stock, the most careful measures be continued to properly protect the purchaser from infestation from this source, and to this end all fumigation be done under the supervision of the Government, and official certificates be issued to accompany each shipment.

M. Pettit, Chairman.

Mr. Murray Pettit: I will move that this report be adopted as read.

Mr. Caston seconded the motion, which was carried.

The Secretary: I would like to move that the same committee be continued during this coming year, because this insect is gradually increasing upon us and I am sure that the work of the committee is just as necessary for the year to come as it has been in the year past. Mr. Scarff seconded the motion, which was carried.

A. H. Pettit: There is one point that I think might be well considered in connection with that report. There was a strong opposition in many parts of the Province where the scale was bad. I think some members of that committee should come from that section of the country. They would give strength to the representation to the Government. Those who have changed their minds and are now in favor of this legislation should be on the committee.

The following were appointed as a committee for the ensuing year: M. Pettit, R. Thompson, G. E. Fisher, E. Morris, Wm. M. Orr, W. H. Bunting, John Wigle, Major Hiscott.

Professor Macoun: I wish to draw attention to these navel oranges that were grown in the open air in half barrels by Mr. Cameron of Niagara Falls Park, and he says they equal any oranges in the market. He also sends some lemons which are very fine.

The Secretary read a letter of explanation from Mr. Roderick Cameron, Queen Victoria Park, Niagara Falls.

Professor Macoun: I think we should all take an opportunity of tasting these oranges before the meeting closes. I should also like to call your attention to the very fine specimens of Keiffer and Idaho pears the President has brought here. They are extraordinary. He has also brought some fine specimens of quinces and peaches, the peaches grown by Mr. Morris. He has also brought some fine Vergennes Grapes.

The Secretary read a letter from E. E. Wartman, Kingston, in reference to an apple box providing for convenient inspection.

Sir,—I express you to-day one of my Patent Fruit boxes. This minature size is not a practical size, I got it made for you to kindly put in a prominent place. The grade of fruit determines the number of trays. I claim this is the quickest inspected fruit case in America. Fruit may be removed and replaced in ten (10) seconds. The King apples in this case are not shown as superior, only they are three inch standard grade.

E. H. Wartman,
Kingston, Ont.

FORESTRY FOR FARMERS AND FRUIT-GROWERS.

Prof. H. L. Hutt, Ontario Agricultural College, Guelph, Ont.

There is perhaps no subject at the present time which is more deserving of attention by the farmers and fruit-growers of this country than that of forestry, and unless we arouse ourselves and give it that attention which its importance demands, we shall be compelled to suffer more and more severely for our negligence.

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The forestry problem which our fathers and grandfathers, the earlier settlers of this country, had to face was quite different from that which faces us to-day. They found the land thickly covered with forest and watered by numerous streams. The question with them was how quickest to get rid of the trees to make a clearance for the growing of crops. With axe and fire clearances were made. Year by year they have widened, until now the country is nearly all clearance, and it is only here and there that a bit of the original forest is to be seen. And what has become of the numerous brooks and streams? The clear running brooks of those summers are now our dry gullies down which the muddy water rushes for a few weeks in the freshets of spring.

But let us look deeper and see what else has attended this undue removal of the forest, this stripping mother earth of her natural covering. Where has gone the fertility which produced the crops and bountiful harvests of those days when more than half the land was in forest? Some of it no doubt has been carried away in the crops sold off the farms; but has not the greater part of it been washed away in the floods of spring and been carried out into the rivers and harbours where the Goverment annually spends thousands of dollars in dredging it out of places where it impedes navigation.

Why have we not the rains and showers which then so frequently watered the crops and pastures, while now the drouths of summer seem each year more severe and prolonged? This is becoming a most serious question. Why the increasing extremes in our climate, the more severe heat of our summers and the more biting cold of our winters, this loss of fertility, of showers, of shade, and of shelter, has it not been largely brought about by the loss of our forests.

Why these annual floods, which in spring now threaten destruction to both life and property in so many parts of the Province? Right here in Brantford, besides the great losses which have occured from time to time, over $100,000 have had to be expended on works for flood protection alone. Is not all this directly traceable to the removal of forests?

Why these cyclones and tornadoes supposed to belong only to the prairies, but which are now becoming all too common in their visits? Our unseasonable frosts, and floods, and drouths and cyclones are they not traceable largely to the undue removal of the forests? We shall not take time to enter into an explanation of the reasons for the existing state of affairs, but is it not time we began to arouse ourselves to the importance of this question?

In order to maintain conditions most favorable to agricultural and horticultural prosperity, there must be a due proportion between field and forest, and at least twenty or twenty-five per cent of the country should be in woodland. In some European countries the people, and the Goverment back up the people, have deemed it wise to maintain a much larger proportion than this. In Germany 26 per cent. and in Austria 33 per cent. of the land is reserved in forest. How much attention have we given to the maintaining of forests in Ontario?

The representative of this riding, while speaking in the Legislature last year upon the causes which were responsible for the annual floods here, drew attention to the scanty proportion of woodland in some of the central counties which help to swell the floods of the Grand River. In Haldimand the proportion of woodland is only 16%, in Waterloo 12%, in Oxford and Perth 10%, in Wellington and Wentworth only 9%, and in Brant County only 7%; and it is said that in some of the southern counties the proportion is only 5%. Is not this an alarming state of affairs?

The forestry problem with which we in this generation have to deal, therefore, is how can we most quickly re-forest from 10 to 20 per cent. of our country, so as to restore conditions to a proper equilibrium. It would have been much easier and better had we given attention to this at the proper time, and not allowed the removal of forests to go beyond the point of safety. But now, when the harm has been done, and we are all now more or less responsible for it, does it not become the duty of every landowner to look to his acres to see what he is doing in this respect? For every five acres he owns, has he one acre of woodland? To reduce the question of forestry to such figures may appear somewhat unreasonable, but how else is the proportion to be kept up unless every man is willing to do his share? It is not at all unlikely that the man who has all his land under cultivation would be reluctant to give up the immediate cropping of such land for the growing of trees from which he could not expect much return for years to come. But

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it is this short-sighted policy of thinking only of the present, regardless of the future, that has robbed us of the forests and brought about the present unfortunate condition of affairs, and unless we can adopt a more unselfish policy, looking to the welfare of posterity, what is to become of those who are to follow us? We in this generation cannot afford to share the spirit of that son of Erin, who declared he would leave nothing to posterity because posterity left nothing to him.

In considering the question of reforesting, it is natural to suppose that the less valuable lands should be the first to be reforested. The steep hillsides and rocky lands, the river banks, lake shores and swampy lands, the gravelly knolls and waste lands, which should never have been stripped to bareness, should all be again covered with trees as soon as possible. Such lands kept under forest might be made to yield a good annual profit, besides increasing the yield and enhancing the value of the adjoining lands; but the reforesting should not stop at the waste lands. Shall he who has all good land go on chopping every acre of it and leave his less fortunate neighbor, who has a lot of poor land, all the reforesting to do? In justice to the community and to posterity every man should do his share in this respect, whether his land be valuable or not. Just here is one of the greatest difficulties in the way of reforesting. We of this generation are more concerned about present self interests than those of posterity or the community at large, and I fear that, unless landowners throughout the country can be made to see the value of reforesting as a profitable investment, it will be a long time before much progress will be made.

The profitable side of the subject, however, is one which gives more and more encouragement the more it is studied. It is quite true that no immediate returns can be expected from newly-started forest plantation, but the investment is a safe one, and the value of the plantation increases each year.

The value of belts of timber, in the shape of wind-breaks and shelter-belts, which should be planted to protect the crops and buildings of every farm, can hardly be overestimated; and these, when once started, soon grow into value when given a little care at the start. But in addition to its value in this respect, the woodland may be made to yield a good profit from the timber which may be cut out without injuring the value of the forest in the least. The forest, in fact, should be looked upon as a perennial crop, which can be made to yield a good profit with no more labor expended upon it than is required in thinning and harvesting the timber.

I have felt this is one of the important questions that we in Ontario must give some attention to, and unless we can get down to business and make a better showing in this older part of the country we will have to pay dearly for our neglect. Perhaps it is not a question for the Government to deal with. They are doing a good deal in the way of forestry reserves in the newer parts, and this question of re-forestring the older parts is a question which the people themselves will have to deal with. We need more public sentiment in favor of it. I think that when people see the necessity of it they will soon get proper ways of going at the work. I have asked a good many questions in the paper, more than I have answered. I think it would be advisable at some of our meetings to take up this question more fully and see what could be done in the way of more practical methods as to how re-foresting could be started in the older parts of our Province.

Mr. WHITNEY: Can you tell us how they do in Germany? They carry out forestry there very thoroughly.

Prof. HUTT: The forestry question in Germany is one that is carried on by the Government under military control. The forest lands there are looked on as a national property, and every bit of land that is not used under crop in some way is kept under forest, and these forests are carefully cared for, the trees are harvested, none of them are allowed to waste. The trees are cut up, right to the small branches, so that there is hardly anything left of it, and every bit of this wood has value, and there is a revenue derived from it. They look upon a forest there as something valuable which must be protected and preserved. In France, where they have not nearly as much wood as they have in Germany, they have very stringent laws regarding the cutting off or removal of forests. No wood is allowed to be cut without permission; a man may not even go out in his wood lot and cut down trees without permission, and he may be prohibited from cutting those trees if it is considered that it would be a waste to remove them. If they are on the hillside where they might cause the washing away of land, or needed for any other purpose that they consider desirable, they can be prohibited from cutting them down. I do not

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think it would be best for us to have such stringent laws here, but I think it would be better to give more attention to the planting out of shelter belts. In the older parts of the Province every farm should have its shelter belt, a good wide belt of mixed timber planted out, a number of the more valuable trees along with them, and these looked on as a crop from which the farmer gets his winter wood, and probably in time get a good revenue from it. It is surprising how some of these trees grow into value for wood, and they would add greatly to the value of the adjoining property. In the severe winter two years ago there were many cases where crops were destroyed away from the natural forest or natural timber or shelter belts, while right in the lee of the timber belt the crop, particularly wheat crop, was good.

Mr SHERRINGTON: What kind of timber would you recommend for planting?

Prof. HUTT: I think there should be a good variety. I would take first some valuable hard wood, take the black walnut and oak, hickory, some of those nut trees, and then follow with some more rapid-growing trees as a third crop. Take the box alder, a very rapid growing tree, to sdade, and you want a grand shade to force up the other trees. Then as soon as the ground is covered with trees the inferior trees should be thinned out, first to get a mixture of the more valuable woods, ash, maple, elm, which have now great value on account of their wood. One thing about it is that the value of wood is constantly on the increase The price of timber is constantly increasing, on account of the great scarcity of it, and I think there will be very little danger of overdoing the thing in the way of reforesting.

The PRESIDENT: How is the reforesting done, by seeding or planting?

Prof. HUTT: By both. I think some of these trees are best grown right from the nut; oak, walnut, hickory, and trees of that kind which have a large tap root, are better from the seed being sown. Then other trees which are not supposed to be so valuable might be transplanted, just the small trees put in, just about a year old, and then dibble them in; they can be planted very quickly and very cheaply. Of course many have been grown directly from the seed, but they are better to have some of those nursery trees give them a start.

The PRESIDENT: Is there a difficulty in planting young trees in an old forest where there are some old trees, or is it an advantage to grow alone?

Prof. HUTT: There is a big difference in the different classes of trees. Some trees will stand shade, others will not. Trees not requiring shade will of course not thrive so well in a large forest, while the beach will stand any amount of shade.

Mr. SHERRINGTON: In the case of white ash, suppose it attained a growth of six inches in diameter and was then cut, would it then reforest itself, or throw up suckers again and go on?

The PRESIDENT: Yes, the ash will.

Mr. SHERRINGTON: A gentleman in our neighborhood has put out about an acre of ash trees this fall, and he is going to reforest about 100 acres, but he sowed the white ash seed; he is going to leave them until they grow up thick, and will leave them until they get as thick as spokes for buggies and keep the suckers down, and there is a demand now for about 6 inch diameter stock, and 6 feet long, which sells at 50 cents a foot. We have another gentleman, Mr. Shaw, Q. C., who planted a belt of black walnut about eighteen years ago, planting the nuts, and now he has walnut trees 30 to 40 feet high, and about 8 inches in diameter.

The PRESIDENT: That means a growth of nearly half an inch a year.

Mr. SHERRINGTON: Yes. They are doing well and making a very satisfactory growth and have been bearing nuts for some years.

Mr. E. D. SMITH: This is a most important subject, but one feature of it ought not to be overlooked, that is to select a soil suitable for the trees. (Hear, hear.) When I was young I was very enthusiastic about reforesting some land, and was planting it rather for profit, and I planted about five acres with walnuts, 8 feet apart each way, and I kept it there for about seven or eight years, and finally got discouraged and had to tear them out. They would not grow as the land was not suitable for walnuts; which require a deep dry soil, mountain side or the foot of a mountain where it is deep and rich, while this land was thin and poor. My idea was to select the least valuable land for reforesting, but in this case it was a failure. No doubt it would have been all right if I had selected the right kind of tree for that soil.

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The PRESIDENT: Had you a good surface soil?

Mr. E. D. SMITH: Yes, fairly; it was not deep.

Mr. SHERRINGTON: This soil where those walnuts are that I speak about in our neighborhood is a pretty strong clay.

The PRESIDENT: Has it been farmed for years?

Mr. SHERRINGTON: Yes, just on the border of the corporation of the town. They were cultivated right along.

The PRESIDENT: Was there any fertilizing?

Mr. SHERRINGTON: I could not say. I presume there was, for anything he does he does it right.

Mr. PICKETT: What distances did he plant them?

Mr. SHERRINGTON: There is a double row, I should say the distance would be about 5′ to 6′; they are not closer than that; I never measured the distance. It is right along the west edge of his orchard; he has seventeen acres of an orchard.

Mr. WHITNEY: Would it not be well to pay a little more attention to this subject of reforestry in the "Horticulturist?" It is more important than we think of just now. I intend to write up the subject in my own paper, and do all I can in our eastern part.

Mr. G. C. CASTON: On the north side of an orchard about five miles north of where I live there is a row of black walnuts, the largest of them is about 8 or 9 inches in diameter. I think there are eight or nine of them in a row. It is a rather bleak place, and they are as thrifty and healthy as can be, and seem to be growing as well as trees can grow. The walnut was not found anywhere within 40 miles south of that, but this is growing there and doing well. This question of forestry is vital to this country. In our section we have had more wells go dry this summer than ever I knew before, and we have streams that once drove mills which are entirely dry now. We lose the moisture furnished by capillary attraction by not having a surface of green leaves; we are getting too much like the prairie. We will have to turn our attention to forestry in this country. The lack of moisture is due chiefly to the want of trees. If we knew, as fruit growers and farmers, what we lose from lack of moisture, we would hardly believe it. We ought to make a start along this line of reforestry. In the northern sections there are a good many counties that have strips of land called waste land. The lumbermen bought that land with timber on it. They then took the timber off; but it did not pay taxes. I believe it would be advisable for the Government to take that land and reforest it, because it is not good for agricultural purposes.

The PRESIDENT: Is there any growth on it?

Mr. CASTON: No, not to amount to anything. Cattle run over it; it is a kind of free pasture. If that were covered with some of the economic kinds of timber it would serve a three-fold purpose: it would help to retain the moisture, it would ameliorate the climate, and supply fuel for years to come.

The PRESIDENT: If the cattle had been restrained would not that all have been reforested naturally?

Mr. CASTON: In spite of the cattle some land has covered itself with pine and poplar. Poplar is a very fast growing wood and can be used for making one kind of belt, but unfortunately the second-growth pine, when they get big enough for a belt timber, are cut off by the lumbermen. A few years ago the Government passed a statute that any person planting a tree along the road would be allowed 25 cents for each tree, in commutation of their statute labor, but the tree had to be three years planted, a living and healthy tree. There has been a great deal more tree planting along the roadside of late years than formerly. The Government have turned their attention now to reforestry in some wild tracts of land in the northern district, and with a good deal of success, but we ought to turn to it in the older sections. We should have the land growing something, if it is only melons, and not lying barren.

Mr. RICE: Nature had made seeds in such a way that they will seed themselves. For instance, ash seed is made with a wing to it, and a sharp point, and it is sure to strike on that sharp point and will pierce the moss, or the grass, and plant itself. There is no great knack in planting White Ash seed, and so with the maples. The seed of the Soft Maple is very large, and often that maple will grow as fast as the poplar or the cotton wood. You plant it out and it will grow two or three feet the first season, and the second season be five or six feet high. That is what we call the Dark Stem Soft Maple. I

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got the seedlings from Nebraska. I find they stand our climate better. In Port Huron we are troubled about our shade trees; our native Hard Maple does not stand our climate, and even the Soft Maple is subject to the borer so much that it is very little use to us, and this western maple I got stands the drought better than any of our native maples and it grows so rapidly that trees I planted twelve years ago are now twelve inches in diameter and forty feet high. Now if we would scatter these seeds in our woods, nature will take care of them. They can be flung around and as soon as they strike they work right down through the grass

Mr. SHERRINGTON: What is the difference between White Ash and Rim Ash?

Mr. RICE: I do not know any difference at all. I do know that the White Ash makes a splendid tree, and they run up so fast that they make a fine growth. Since I read my paper, a gentleman, about seventy years old, said to me that he wanted to plant ten acres next spring of black walnuts, saying he had the nuts all saved ready. I told him to spread them on the ground and cover them over enough to keep them moist the rest of the winter and then plant them next spring. In protecting nuts, imitate nature just as near as you can. Nature will drop those in the leaves; scatter the leaves over and do just exactly as you think nature would. Spread them around the ground, scatter a few leaves over them, and leave them there till the spring. In planting sweet chestnuts, get the nuts from trees grown in the north and they will produce hardier and better trees. The native chestnuts grown on your hillsides here may be cut off and they will sprout again like the catalpa, and you will have a perpetual forest after you get chestnuts once started, as long as you keep the cattle out of them. The great key-note of starting forests is to keep the cattle out and keep the leaves on the ground. Also keep your fires out of the woods If you observe these rules you need not trouble but what you will have a perpetual forest. That system of forest renewal was established, the Bible scholars say, about 6,000 or 8,000 years ago, and it has worked well so far. The forest has been renewed ages after ages, and keeps right on. We had good forests when we came here but we are tempted to disturb nature and so we are losing our forests. Here is a board from a Carolina poplar tree that is eight years old, and here is a board out of a tree seven years old.

Mr. CASTON: That is like Lombardy Poplar.

Mr. RICE: No, that is a great deal better than Lombardy Poplar. You will find one thing peculiar about this lumber, it will work very thin, and you may pull a little strip off it and you cannot break it in your fingers, it is so tough.

Mr. CASTON: Is it as hard to get rid of as the Lombardy Poplar?

Mr. RICE: Nobody wants to get rid of it.

Mr. CASTON: Lombardy Poplar is as big a pest as the Canadian Thistle.

Mr. RICE: It is just how you look at it. I always protect the Canadian Thistle.

The PRESIDENT: So do I.

Mr. RICE: If I was going to buy a farm and one was covered with Canadian Thistles as high as my head and so thick that a rat could not get through it, and the other was clean, I would take the Canadian Thistle farm every time by all means.

The PRESIDENT: So would I.

Mr. CASTON: You could never in two generations get the fertility back again if you have Lombardy Poplars.

Mr. RICE: There is no trouble at all.

Mr. SHUTTLEWORTH: How do you get rid of the thistles?

Mr. RICE: There is one man up in our section that has the nicest way to get rid of them that I know of. He fall plows the ground, then drags it once or twice during the spring and gets an immense growth on it, then in June plows them under, and sows to buckwheat, and rolls them down as flat and solid as he can, and he gets an immense full growth of buckwheat, and the next year he has got good ground for any crop, and he has no thistles.

The PRESIDENT called attention to the Hairy Vetch which grows ten feet in length, and which was being tested this year as a cover crop.

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REPORT OF THE EXECUTIVE COMMITTEE.

In presenting the Report of the Executive Committee we would like to call attention to the constant growth and development of our work.

In the year 1859 this Association was organized, and in 1868, when it was organized under the Agriculture and Arts Act, it numbered 242. In 1886 it numbered 1,652, and to-day it numbers 4,500 paid members.

The cost of publishing our journal is constantly increasing, and must do so if we are to keep pace with the times. This year it has cost us about $2,500. You will notice that we have printed regularly 48 pages and cover which, with the increased number of pages, makes a very material difference in the printing bill and the amount of matter published. And we have a notice that there will be an advance in the cost of the paper for 1901 of $17.00 a month, or $204 per annum.

Another heavy expenditure is in connection with our affiliated societies which, in return, are a great source of strength. We have now over fifty of these societies in affiliation with us, and very soon we shall probably have all the horticultural societies in the province with us. So far we have helped these societies very materially by sending a lecturer once a year to address them on a flower or fruit topic—a system which keeps these societies in touch with us, and at the same time educates the public. The expense of these lectures is between $200 and $300 per year, and is increasing annually. Indeed, to do this work as it should be done, an expert should be employed. We would advise, in view of these new undertakings, that we ask the Department of Agriculture to make our grant for 1901 $2,500 instead of $1,800. We have not for many years made any such request, and we are sure that now the time is opportune for such a request in order that our work may be carried forward as effectively as possible.

The SECRETARY: I would move that this Association endorse the report of the Executive and Directorate.

A. M. SMITH seconded the motion, which was put and carried.

GARDEN FAVORITES.

BY W. T. MACOUN, CENTRAL EXPERIMENTAL FARM, OTTAWA.

As I presume that the ladies, who are to follow, will take up the subject from the aesthetic standpoint, I will confine my remarks principally to the cold and practical aspect of the question relating to growing flowers, and also bring before you what we consider the best flowers to grow. In arranging our flower garden we had in view the keeping up a succession of bloom from early spring till late autumn. By adopting good rotation, as it were, you can have a splendid show of bloom from the latter part of April, in fact from the middle of April, until frost comes in the autumn. In arranging this garden I divided the classes of plants into spring flowers, bulbs, annuals, perennials, and in some cases dwarfed flower shrubs. I may say that perennials in this case included the lilies and irises. By getting a proper collection of bulbs in the autumn you may have a selection of fine bloom from the middle of April until the latter part of May. There are so many beautiful varieties of narcissus that it is surprising that more people do not get some of the better sorts. We very often get good results from the mixed bulbs, but you will get far better results from named varieties, because in this way you can arrange your garden so as to get the best effect and also be able to study the different varieties to tell your visitors about them. Unless you have done this you do not know the satisfaction there is saying to a person when he come into your garden, "This is a Kaiser Kru that I paid ten cents apiece for, the most expensive bulb in the market," and so on. It is a great satisfaction in knowing something about them and having something to talk about. Now, these named varieties will cost a little more than the mixed sort. I have made out a list of what I consider the few best flowering bulbs.

Early flowering Crocuses, Squills, Hyacinths, Tulips, Narcissus.

Now, if you have only seen 5 or 6 combinations of colors upon early bulbs, you may imagine what a fine sight it is to see fifteen or twenty of those fine varieties growing in

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your garden, though you may not be aware that the number of varieties has gone up into the hundreds, and these are the very best, and I assure you it is very hard to restrict this list to the few varieties that I have mentioned. Besides bulbs there are a great many hardy narcissi. As a rule the only naricissus we find in the garden is the Poet's narcissus. This is a very hardy sort and blooms very freely. There are a great many varieties in narcissus, just as there are varieties of bulbs, and by getting eight or ten apiece of these you will never regret it. At Ottawa, where we have very severe winters, we can bring these fine narcissi through without any trouble by simply giving them a little mulch straw in the autumn. The varieties which I consider the best for planting are the following:

Cynosure, Stella, Incomparabilis ft. pl. Orange Phœnix, Sulphur Phœnix, Princeps, Golden Spur, Emperor, Horsfiedi, Bicolor Poeticus Ornatus, Poeticus, Poeticus ft. pl.

This will give you a succession of narcissi covering probably three weeks, and any of you who have not seen those beautiful narcissi can't imagine how fine they are. If you have seen them in the florist's window, some of these immense fellows with long trumpets, you may think they are very difficult to grow, but they can be grown just as easily as the Poet's narcissus, which you see in every garden, and they are so much better that it is surprising more people do not get them. We should also have some hyacinths in the garden, as they are beautiful flowers and do very well when planted in the autumn and given direction. I have made but a short list of these.

Hyacinths.—Gertrude, Gigantic, Lord Macaulay, Roi des Belges, Grand Lilas, Von Schiller, La Grandesse, Norma, Grand Vidette.

Of course there are many others, but these are, in my judgment, among the best. These are also the best kinds for pot culture in the winter time. It is a great mistake to get too many varieties of hyacinths in the winter. There are certain kinds which force much better than others, and which give you all the range of bloom that you desire. The list I have given I have found best for the house and garden. Of course we should also have in the garden in the early spring the snow-drop and the squills, crocuses, which come on before the bulbs, narcissus or hyacinths. Unless you have some early flowering perennials you are going to have a blank in the garden before the annuals or later flowering perennials begin to bloom, and we have found that the Iceland poppy fills this blank. It begins to bloom very early in May, and will continue to bloom all summer if the ground does not get too dry. It is one of the most satisfactory perennials that we have found at Ottawa. It has stems from six to eight inches long, which make it very desirable for cutting, and the prevailing color is of a lemon-yellow, which is very effective in vases and makes it a very useful plant for decorating in the house. The Iceland poppy seed themselves and come up every year, and by leaving some of these in your beds you will get this succession of bloom following the bulbs. Then, after the bulbs there is always a long time in most gardens when there is very little grown, hence the advantage of having this Iceland poppy. Then there are a great many fine early flowering perennials. It is a necessity to plant annuals to make a show in the bed all summer through. These, however, will not begin blooming until about July, so you may have to make provision by early bulbs and by your Iceland poppy and by some other perennials, and there are plenty of them.

Mr. Rice: Is the Iceland poppy an annual?

Mr. Macoun: No, it is a perennial; but you very often get it to flower the same season. The seed from the first flower in the spring very often flowers the same season. I will now give you the list of the best annuals to grow. No one can do without sweet peas. They begin blooming about the first week in July, and you can have them up to the hard frost, and I am sure that you will agree with me in saying that there is no finer flower than the sweet pea. You will have no trouble at all in finding plenty of varieties to suit you, because they are all good. Then there are nasturtium, poppy, verbena, petunia, portulacca, coreopsis, aster, dianthus, marigold, zinnia. The zinnias are rather coarse, but make a fine show for fastening together. These annuals I have mentioned keep up a better succession of bloom than any other. I should have mentioned the Phlox Drummondi, which is among the very best to grow. Among lilies there are so many beautiful sorts that you can have a succession of full bloom from the latter part of May until September, which is a very long season. The best species are the Lilium auratum from Japan, and Lilium speciosu; then there is a variety of Lilium elegans

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which is very handsome; it is a sort of crimson-red color, but it makes a very fine effect. Then, amorg the irises, you can have a series of bloom from the latter part of May until the middle of July. The Siberian irises, which are not very good compared with some others, but which begin to bloom the latter part of May. They are closely followed by the German irises, which you should certainly grow. We have, I suppose, one of the best collections in the country at Ottawa, and all who visit it are surprised at the beauty of the different varieties. The color ranges from white to purple, blue, pink or reddish shade, and they are all intermingled in the flowers so well that it gives them a remarkably handsome appearance. Then following the German irises are the Japanese irises, which are very easily grown, and which extend the season of irises up to the middle of July. A great many people think you have to plant the irises on moist soil because our native irises grow there, but it is not necessary. Some of our best results in irises are on light soil. I might say that we have about 1,200 varieties and species of perennials growing at the Experimental Farm at Ottawa now, and among those I have chosen a few which I consider the best for planting and which cover the field very well, which I will now show you. Of course these dry specimens do not give you any idea as to the beauty of these plants. Mr. Macoun then exhibited a large collection.

OUR FRIENDS, THE FLOWERS.

By Miss A. Hollingworth, Beatrice, Ont.

I wish I could have seen more farmers here, because I want to talk to them of Horticulture. I have always lived on a farm myself, and I want to see the farmers' homes the prettiest in the country, and there is no reason why they should not be, yet the town and city people make a better show of their surroundings than the country people notwithstanding all the advantages that nature has lavished on them. Of course we have some very beautiful farm homes in Ontario, but the majority I find are very desolate looking places, and there is no excuse for it. Why there are not more flowers grown around the farm houses I cannot understand. Two summers ago I travelled around Midland and only saw one good flower garden, and that was at the home of an old bachelor over 60. (Laughter) You generally see a forlorn looking little bush in one corner, and perhaps some orange lilies growing up amongst the grass, but in the great majority of farm homes there is a bad want of flowers. It is not necessary to have a great quantity; that is a great mistake, because you may try to do too much. Farmers have not time to have specially fancy plots such as they have where gardeners are employed. Rockeries are very nice if you have a hose and can give them plenty of water, but if you cannot give the time to them better not have them, because they look very dreary with dry flowers upon them. Another thing that looks often foolish, is the hanging baskets and the long narrow boxes nailed to the window ledge. This is a good idea for the town houses, and I have passed houses in town that were simply delightful to look at because of the bright window boxes, and I have passed other houses that were an eyesore because they were not attended to. If one goes in for this sort of thing it ought to be attended to or let alone. I find that for busy people the most satisfactory thing is to plant shrubs and vines, and if we cannot afford the nursery stock the woods will help us out with beautiful native vines, and if we cannot afford fancy trellises we can make rustic trellises, get young seedlings and dig holes each side of the garden path and wire those seedlings back and make a rustic arch and train vines over. I have those over my garden paths and over the verandah and over the summer house, and those go a long way towards making a house more home-like; it looks as if somebody was living there, and not just a calling place. Another thing I notice is that I seldom see rustic work in the country where we can have it for the trouble of making them, and also in the towns where people can appreciate these things. There is no reason why we should not have rustic seats and flower stands, because they are easily made. I think the cedar is the nicest for this work. I took a photograph of a seat that was made at Niagara Falls, and used that as a model. You will also find young pieces with a very graceful curve at the bottom of the trunk, and those curves can be used to great advan-

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tage in making this rustic work. My hands are rough with this sort of work; I do these things rather than have my home desolate. We take these curved stems for the back and the arms and the legs and the seat, and then take these four feet cross bars for the bottom of the seat and split the lighter part of the stems in two and nail them flat side down on the seat. It is seven years since we made that, and it is a good substantial seat yet. We make flower stands on the same principle. I would like also to speak about house plants; I like to see lots of plants in the house. There has always been a theory about that they are not healthy, and it is the most foolish thing that people who think it safe enough to keep them in their living rooms think it is not safe to have them in the bedrooms. That is all nonsense. There is nothing better to have around you than plenty of plants, because they not only purify the air by taking up the carbonic acid gas which we have thrown out, but they are a good indication of the sanitary condition of the house. If your house plants are not in a healthy condition your house is not fit for you to live in, and you may well look to your means of ventilation. Of course there may be other reasons for the trouble. We often make the mistake of keeping too many window plants in the one window. A plant needs a good deal of light, and it is better to have a few healthy ones than many sickly ones. At this time of year it often happens that our window plants get frozen, and if we let them alone they will generally die, but we can often save them by removing them as soon as we find they are frozen to a room where the temperature is just a little above freezing point and shower them well with cold water and then cover them up and keep the light from them. In that way we can save delicate plants that would otherwise die. I have often followed that plan with delicate annuals in the garden, then I have gone out before sunrise and watered them with the coldest water I could get and often saved them in that way. After house plants have been in the house all winter we must make the change gradually in taking them out to the verandah, and the same again when we are bringing them into the house in the fall. You will often notice that the leaves and the flower buds also will turn yellow and fall off. There is a great difference between the atmosphere outside and inside, and the plants are very sensitive to it, and in the fall instead of bringing them at once into a room that is heated by fire you should put them into a room where is no fire and give them plenty of fresh air.

Make the change as gradually as possible. If you are troubled with plant lice or other pests, the best insecticide is tobacco cut up and left over night on burning coals in a room with the plants, or in a large packing case if there are not many. Those who have the care of children should not miss the refining influence of flowers. A four year old child whom my sister had taken while her mother was ill, on her return home begged to be taken back because of the flowers in my sister's home. I find that is the case with almost all children. When their minds are beginning to unfold, the ruling passion with them is a love for plants and animals, and it is a pity that more advantage is not taken for developing their finer instincts. We find that instead of that, children are often made old in their ideas; grown up people tease little children about love and marriage, and stuff their heads with all the wrong notions that should not be there to the exclusion of better and purer knowledge that parents should instil in them. How much better it would be to set the children's minds thinking of the great wonders of nature around them. I am sure that any child would be delighted to learn the history of the pollen grain, that fine yellow powder that falls from the centre of the flowers. It seems so insignificant, and yet like all Nature's workings it is so wonderful. Miss Hollingworth continued her address, giving an interesting history of the pollen grain with illustrations.

FRUIT AND FLOWER CULTURE IN ENGLAND AND IN CANADA.

By Mrs. John Hoodless, Hamilton.

I have come to you to-night to ask your co-operations in securing better facilities for educating women in their special occupation on the farm. This stimulus was given me two years ago when I was visiting in England. I have no doubt that there are in this audience a good many revolving in their mind the question, what can women do in agri-

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culture, in horticulture, in fruit growing? I used to wonder in the same way, but by a happy circumstance I was enabled to visit in England the agricultural and horticultural schools for women, and was astonished to find what has been done there and what can be done by women. I spent three days at the Lady Warwick Hostel at Reading and also attended a conference at Reading College at which I heard very fine addresses on various subjects, among others how our Canadian produce is shipped to London, and the condition in which it is received, some facts which would not be altogether complimentary if I attempted to tell you all about them. This college is only one of many institutions of the kind throughout the country. I also met representatives from Belgium, Germany, Sweden, and France who told me about the agricultural schools for women in those countries. In Belgium the women receive quite as much attention in the agricultural colleges as the men, in fact they have a very thorough course; and, as you all know, the women in the United States are receiving almost the same attention in the agricultural schools. I know that all the gentlemen present are representative Canadians and extensive fruit growers. I believe if you encourage the Government authorities we could have something done for women here, but you know we women have no votes and therefore have not a great deal of influence. My reason for coming here to-night, is to ask you to use your vote and influence for the education of women in this land. In the college mentioned, Lady Warwick Hostel, the majority of the students were gentlewomen—a very desirable element to interest, because we all know that women of refinement and culture with trained minds, can grasp points and will take much more intelligent interest in matters than the uncultured women of denser mental power. There cannot be too fine training or too much education for women who are going into a question of this kind; therefore they have made rather a stipulation that all those entering shall be women of a certain degree of culture. I saw those young ladies not only digging in the garden, but trenching, preparing the soil for mushroom beds; I saw them working in green houses, and doing everything that could be thought of on a farm garden, or in small agriculture. I discussed the question with the warden, the professors and teachers but, in order to get another point of view I got up early one morning to speak to the gardener so as to get his opinion as a practical man. I asked him if he thought young women would ever be a success in this work. He said, "Madam, I have been astonished at the progress made by these students. I have worked in Mr. Sutton's garden for years, and other large seedmen's institutions, and if I had large green-houses I should rather have women in them than men." I asked why, and he replied, "because they are so much more careful in potting. They attend to the details of the work; they take far more interest in their work in training vines or anything of that kind, they are so much more deft, they are not half so apt to break them. Taking them all in all I consider it is quite in order for women to do this finer work in the green houses" (Hear, hear.) In England they are always bemoaning the surplus female population, and they must find something for them to do; but is not that fast becoming a question here? In Ontario we have quite a surplus female population, therefore is it not time we were considering what we are to do with these unoccupied individuals who should become producers as well as consumers in the interests of their country?

I also saw these students working in the poultry yard, saw them even stuffing fowl. Of course they are taught all this scientifical y, not altogether with the view of their doing it themselves but with a view to their directing others. A lady calling at my house last summer and speaking of the question of directing others said, "Five years ago I was left two estates to manage. One was a vineyard, the other a farm. I went from New York to take charge of this vineyard on the Hudson without the slightest knowledge of anything about it. The gardeners wanted to run things their way, but I saw that I had to be very careful or I would lose money. I went to a scientific gardener, spent two or three days with him, had him show me how to prune grapes and pack them; I packed three tons myself in little five pound baskets and got the highest price in New York markets. In two years I came out ahead, but it took me a year to find a man who would do things as I wanted him." They would insist on doing it as they wanted; and that is the difficulty women have to contend with. (Laughter.) Therefore you can understand why a scientific training is necessary if women are to make a success of this work. Just after Mr. Woolverton asked me to address this meeting I wrote to the lady president of the Agricultural and Horticultural Union of England, and asked her, "What

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can I say to our people about the shipment of Canadian fruit to London?" and she replied, "Tell your people to send their fruit to London in better shape; tell them to pack the fruit in small packages, pack according to grade, to put the good kinds in one box, and the second and third grades by themselves." I found when I was in London that by packing choice grapes and pears by themselves as first grade they brought enormous prices,—they are simply for the nobility—only dukes and the royalties can buy these. When they are packed good, bad and indifferent together they bring the lowest price. This I saw for myself. The same remark applies to the packing of eggs. A packer's agent said that Canada sent the worst specimens of eggs to London of any country that sent food products to that city; he showed me some of them—big eggs, little eggs, yellow eggs, white eggs, all packed together in a crate, consequently they brought the lowest price—just the same as the fruit. Of course you know the reputation apples have—big ones at the top, the poorest in the middle. I have had them say to me, "You have good apples in Canada, but you have dishonest packers." (Laughter.) I said, "We have a few honest packers." Londoners will pay any price, and they are perfectly willing to pay for the best. Now if you can arrange a cold storage system such as we heard so beautifully described this afternoon, and with proper packing so as to secure the London market, I think the fruit growers would soon become rich. I have a little notice here which I clipped out of an English paper which I thought might be interesting concerning grapes from Canada:—

"There is now every prospect of a cheap supply of fresh grapes being put upon the English markets in future years during the autumn and winter months. Already the test shipments of these fruits, carried in refrigerated chambers, are on show at Manchester, and the trade expresses much satisfaction at the salable nature of the fruit. There can be no doubt that this great development of the Canadian fruit trade in the United Kingdom will do much to extend the demand for cheap late grapes, for hitherto the middle and working classes have had to depend upon the hard Spanish Almerias, which are sent into our ports packed in cork-dust in barrels weighing from 50 lbs. to 60 lbs. gross. These are the well-known green grapes, so popular with grocers and dried-fruit traders. The Canadian supply will ensure ample quantities of luscious, aromatic grapes, of far superior quality to the Almerias and at a reasonable price. These new grapes have already produced a bit of a sensation in fruit trade circles, for when arrangements have been completed the English markets will be kept well stocked with regular shipments of fresh grapes put up in dainty little baskets, and thus render the storage of the Almeria grapes by market men, to ensure supplies after Christmas, unnecessary. The quality of the fruit is excellent, and it is highly satisfactory to know that Canada can send to this country all the late cheap grapes we need. Although, as previously announced in the *Daily Mail*, the Canadian fruit exports will include the finest pears that are grown, yet the addition of late grapes by no means exhausts the list. Various other fruits are to be sent in time, and the French, Spanish and Dutch shippers will find many of their fruits displaced by the superior products despatched from Canada.

It was only last year that satisfaction was expressed. When I was there two years ago they condemned the Canadian fruit as it was then sent in. Is not the trade in England, as outlined in the paragraph I have just read, worth striving for? At one of the conventions I was unfortunately called upon to second a toast at one of their banquets—which was rather a progressive idea for that staid old country—I took this opportunity to ask the British gentlemen present to explain what had puzzled me considerably in the London markets, in which I was intensely interested. I said that I had been through the London markets, had seen on the bulletin boards all sorts of foreign products—from Germany, Russia, Denmark, Normandy and other countries—but it would take a patent magnifying microscope to find Canada. The answer given was "The reason Canada was not put on the bulletin boards was because its products had got a bad name," and they added, "The fruit, the poultry and the dairy produce that comes in here, if really good, is sold as British, and the inferior is labelled Canadian." Now I thought that very unfortunate. I made enquiries, and told it was true that many of the food products had come over in bad shape and consequently the Canadian fruit had got a bad name, the first class goods had been sold as British in order to bring a good price. They said, "If Canada sends us first class articles we will guarantee to give them a preference." (Applause and "hear, hear") That remark was vigorously applauded by two hundred and fifty representative British gentlemen. Now the question is, how are we going to get our people to export these goods properly? An agricultural paper tells us what women can do in this matter. The article divided them into two classes, the educated and the uneducated. The educated would be useful in writing delivery notes names of plants, directions, invoices, letters, etc., gathering and packing flowers and sundry fruits and vegetables as peaches, grapes, tomatoes, cucumbers, etc.; tying up choice plants, cutting making, pruning, seed sowing and grow-

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ing etc., etc.; while the uneducated could do potting, hoeing, weeding, dressing against insects, watering, seed saving, tying and training, thinning grapes, etc., etc., and much of the same kind of work as undertaken by the educated, but turned over to them as being of a rougher nature. Training schools for women are receiving a great deal of attention in England, and the necessity for them here was emphasized last fall when I offered a prize for the best trussed fowl at three or four of our exhibitions. Some farmers asked what was meant by trussed fowl; they wanted to know if they were to be cooked, plucked, or what had to be done. Now when our people do not know how these things should be put on the market, how are they to learn without teachers? The thought occurred to me that it would be a good plan to bring out one of these scientifically-trained English women who can explain and show us exactly how these things should be placed on the English market—one who had had sufficient experience and training to co-operate with our packers and show them exactly what should be done. That is just a thought, suggested in passing, from a woman's point of view. Speaking again of the Lady Warwick Hostel, I saw the students making mushroom beds; one lady told me she had served a three months' apprenticeship to this, and the year before she had made quite a large sum from the cultivation of mushrooms alone. Now when these things can be done in England, they can be done in Canada. About three years ago we asked the Farmers' Institute to co-operate with us in establishing women's institutes throughout Ontario. The government made a small grant for their support, we have had meetings, papers, and talks until we are weary of them. We want something more than talk, and the women's institutes have got to the point now when they want a practical teacher. Many admit that they do not know how butter should be prepared for the market, that they do not know how to care for fruit or flowers or anything else scientifically and they are anxious to be taught. Therefore, scientifically trained teachers, who will go out through the different districts and give the women, through the women's institutes, a thorough practical training is the need of to-day. You may think this is a Utopian scheme, but it has been done in England at the expense of the county councils, and I believe our county councils would co-operate in such a movement. We have asked our government, through the women's institutes, to consider the establishment of a women's building at Guelph. I do not know whether they have given the question any consideration or not, but I assure you there is and there will be a demand for that training. In order to show you how this question will appeal to the intelligent class of women, I may say that during last year at the Normal School of Domestic Science in Hamilton this question was discussed with the result that three students are making application to enter the Guelph College to learn butter making and poultry raising; and to take lectures in bacteriology and entomology; so you see there is rather an intimate relation between the two subjects. I was struck to-day, in hearing Hon. Mr. Latchford's address, by the very close connection between domestic science and flower culture. When those girls came to our school they had not the faintest idea of taking up horticulture, or dairying or anything of that kind, but they got interested in bacteriology and other subjects related to these questions, which led them to believe there were such instructors needed. This is why I come to you to-night to ask you as representative Canadians to support the women in their appeal to the government for a building at the Ontario Agricultural College where young women may study entomology, scientific flower and fruit raising and any other branch of agriculture for which they may be fitted. In passing I may say that flower culture may be made very profitable. Few people in the city think their table complete without flowers, and the demand for these things is increasing; from being a luxury, flowers are now considered a necessity. Such an institution as I am here asking for will strengthen your cause and give you true helpmeets in your homes. I repeat what has been done in England and other countries can be done in Canada. The year before last I was collecting information from the different provinces as to "What were the Possibilities for Women in Agriculture?" for the Paris Handbook. From every province, even from Manitoba, where they would not expect to do very much in the way of fruit and flower culture, the answer was that such work could be made profitable by the women. Provide the training school, send your daughters there instead of to a commercial or Normal school, then agriculture for women will become popular. (Applause.)

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SHIPPING APPLES TO GREAT BRITAIN.

J. M. SHUTTLEWORTH: I have been very much interested indeed to hear the addresses that have been given to-night by the ladies, and also those that were given this morning and yesterday by the gentlemen. As you are aware, I have taken issue with some of the views expressed. A great deal has been said about the ignorance of Canada by our English friends. For seventeen or eighteen years I lived in England, and I did find that there was ignorance, but not such gross ignorance as one would suppose from what has been said by some. Dr. Saunders spoke about not being able to find Canadian apples in Liverpool and also made the statement that our apples did not reach places very far outside of Liverpool. They must have been consumed somewhere, and someone knew about Canadian apples. The point is this: our Canadian apples last year were falsely packed, most dishonestly packed, and it brought ruin or almost ruin, to a great many of the men who packed those apples, or for whom the apples had been packed dishonestly. There were about 500,000 barrels of apples shipped last year to Great Britain from Ontario alone. Had there been 250,000 instead of 500,000, more money would have been brought back. This is a very important question, this one of dishonest packing, and one that we must not shirk in any way, shape or form. We have got to get at it in the best and quickest way we can if we want to keep our reputation, or at least regain it, for we had a better reputation a few years since than we have at the present time. I may say that this year I have had but very few complaints from our people on the other side of false packing. Our fruit was good, price was low, and there was not the same incentive. If our English friends can take nearly 2,000,000 barrels of apples at a fair price, what are the possibilities of the Canadian trade? What are the dimensions to which the Canadian trade might reasonably and profitably be developed? I think we might say there is a strong sentiment in favor of Canadian products at the present time. There is a very kindly feeling on the part of the English consumers towards us, that if we can put on their market as good, or a little better, fruit than the others they will consume more of our fruit and pay us better prices for it, but they will take it in preference, provided it is just as good, if they know it is Canadian fruit. I believe that. There is a good deal of sentiment after all, and you will see that more and more as the years go by, I think. If we can take 500,000 or 1,000,000 barrels of our apples, packed as they are now and with the quality of fruit that we are giving them and the varieties, and get a fair price, I think we might reasonably expect that a profitable business might be done in the future with better facilities for shipping, with better handling of our fruit, better grade fruit and with better varieties. We could double or even treble it; some think more than that. I think we could improve the quality of our fruit and we will get better prices for it. Referring to the varieties as suggested by Prof. Macoun, there are three varieties that you ought not to grow at all—they are hardly fit for a man to eat. These are the Gano, the Ben Davis and the Pewaukee. The only thing that redeems the Gano and the Ben Davis is their fine appearance, but those that are grown in Kansas are very superior to our Ben Davis and Gano—a difference that I cannot account for. In order to make our hardier varieties such as Spy, and Greening good standards, there is nothing better we can do than graft them on very hardy stock, such as the Tallman Sweet, and we would thus get profitable crops and hardier and better fruit. I am speaking this not so much from my own experience as from information I have had from men who have had experience. I would ask those who are better capable of judging whether I am right or not, whether the Tallman Sweet is a good stock to graft Spys on? (Voices, "Yes"). With improved transportation for the better handling of our fruit the Spy I believe is going to be the apple. It deserves to be. It keeps its nice fresh crispiness until all other apples have become dry. It is a nice looking apple generally, unless the foliage has been exceptionally heavy, or where the trees have not been properly pruned. It is a very nice looking apple; it has a bright appearance.

A DELEGATE: How would the King do?

Mr. SHUTTLEWORTH: The King is a nice looking apple, but there is some objection to the growing of Kings because it is what we call a shy bearer. It takes well. It is a showy apple, but I do not think quite so much of it as I do of other varieties. The apples are usually too large. They bring very high prices because they are showy.

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The reason the Ben Davis has sold in the past is because the apples are showy; they do to dress windows, and they keep their appearance longer than any other apple. They have been used more for show purposes than anything else, that is our Canadian Ben Davis, but if we can get better fruits in our warehouse, which we shall shortly do by having better transportation facilities and better care of our fruit, we will have a surplus of Ben Davis, and they will bring the price they deserve to bring—the lowest price. The most important question we have to deal with outside of the packing is the question of transportation. If you would see, as I have seen in the past few years, the holds from which our apples were taken, you would wonder we ever got our apples there at all. (Hear, hear). I have climbed down into the holds after the hatch was taken off, and the carbonic acid gas made me dizzy. Now, can apples keep in such an atmosphere? Until some appliances are used we will never get over that difficulty, because the first duty of a captain of a vessel is the safety of his vessel. I have crossed often times in bad weather when it was as much as a captain could do to get his vessel in, and where he had to batten down his hatches and batten his companionways for the safety of his ship. Unless we can protect that fruit and give it fresh air we shall have many rotten cargoes. For a long time I have been urging upon our steamship people to pay greater attention and care to the handling of fruit, while on board. About 8 or 9 years ago we were handling a large quantity of fruit from Boston, and one of the lines seemed to think that apples were pig iron, the way they handled them. I saw them discharge their fruit on a gang way, about 18 or 20 feet up, and they were skidding the apples down one after another, and sometimes the barrels would shoot 20 feet, and sometimes the head would be burst out and the apples would be spread all over the dock. I told the man in charge that that must be stopped. He asked me to move away, or I would be hurt. I said I would not. The thing developed into quite a quarrel. However, they telephoned up to the office and asked them what to do. They asked me to come and see them, which I did, and I told them if they could not handle fruit better than that they had better stop altogether. We cabled out and stopped shipping on that line. It was not long before those people realized how important it was to look after their shipping. Instead of getting eight or nine steamer loads they got nothing. We hit them in the right spot. It is the only place you can hit them. The only place you can hit a dishonest man that packs his fruit falsely is in the pocket; and hit him hard. Those people asked us what they should do, and we told them we would not use their ships unless they handled the fruit properly, and now they have some of the best fruit-carrying boats in existence, they have put in exhaust fans and they are drawing off this carbonic acid gas and they are letting in the fresh air. Our apples are arriving in perfectly good condition from these vessels all the time, no matter what the weather is. I believe they will shortly put those appliances in all other boats, and those lines that are going to cater to the interests of their clientelle will endeavor to do what is best for them, because their interests and the patrons' interests are identical, if they only look at it in that way. I might say that the boats that sail from Montreal have not anything like the capacity for the fruits that they usually carry. Some one said, I think to-day, that apples were stood right against the funnel. Well, they can't get there very well, but they can get in the bunker hatches, and that is hotter than they should be. Some of them have been stood in places where there is not a possibility of getting ventilation. They have nothing but open, funnel-shaped ventilators, and you cannot drive air in there. You cannot possibly get fresh air down into those hatches when they are nearly full, or full right to the brim, with a cargo, but you can draw out the bad air and fresh air will find its way in, if you have appliances for it. Another very important matter is that of distribution. You can understand that after our fruit has undergone those hardships incidental to a voyage, under the conditions which you may infer from what I have heard, the sooner those apples are put in the hands of a customer the better it is for everyone concerned. To distribute a good deal of fruit through the country as it lands would simply mean ruin. When you have distributed in London, Glasgow, Liverpool and Manchester you will find that you have about covered the ground. If you attempt to send apples to Wolverhampton or to Birmingham or to Leeds or to Sheffield, you will find that you will miss many chances of getting markets. At Liverpool for instance you will have buyers, as we do, from all those large cities. Sometimes Birmingham is loaded up with fruit; if you had a shipment, or consignment, going to Birmingham you would come upon a glutted market. Sometimes Manchester is loaded

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up, sometimes Leeds, etc. But when one market is loaded up three or four others may be wanting apples; they have not bought so heavily the previous weeks. Sometimes the trade is better there; sometimes textile manufacturers are in good shape, and sometimes the iron, sometimes the coal industry in Wales, so that we have to get a congregation of buyers at a central place to get an even market where prices will run even throughout the season. This is a point which is not quite well understood. For instance, if I have Tallman Sweets—an apple that is not generally liked—I always look over in one corner for bids from certain men from a place called Bolton, where they like Tallman Sweets, as they do in Baltimore on this side and they like Bellflowers in Baltimore. Those differences exist there very markedly. I would never dream of sending Tallman Sweets to Manchester, unless we could get some of those buyers up through the Rosendale Valley to come down and buy them. I would never think of sending Russets to Glasgow up till a certain date, because they do not want Russets there. That brings me back to the point of the middle man; the man who is trained for that service is able to understand those conditions better than you gentlemen here, who are (or should be) looking to the eradication of your insect pests, doing your work well here and not attempting to do it there. You want good, honest middlemen—the only legitimate trader, practically, and you have to depend on him. If we can only get good, honest middle men, backed up by this same sentiment on this side that we want the best accommodation possible for this fruit trade, we will get a great many things from the steamship companies and transportation companies we could not otherwise get. We know what is wanted from that end; you know what is wanted from this end. If you will only back us up we will get some of those things that we want, that we say are necessary. I might make a few suggestions in regard to peaches, pears and grapes. I do not think that our grapes will take very well there. We will have what they call the low-class trade. Englishmen like to bite their grapes, like to take out the seeds, and they don't like to swallow them, as they are afraid of that complaint, appendicitis. They can get those Almerias, mentioned by Mrs. Hoodless, a more solid grape and a nice grape to eat. They can also get the Muscatels and some other grapes from Malaga, and they will never want to eat our grapes over there for the reason that they cannot bite our grapes, as the centres are very sour and very tough. So until we improve the quality of our grapes we may never hope for a real good trade for grapes. I should like to be with you to-morrow, if possible, to talk over that Act to prevent dishonest packing, which is ruining our trade. It has made me sometimes ashamed to think that the apples came from Canada. I have been hauled over the coals a good deal for taking the stand I do in that matter, but I believe I am right. I believe it is harmful to our trade, harmful to our pride, and it is wrong. (Applause).

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. Whitney read the following report which was adopted as read:

Your committee on resolutions beg leave to report as follows:—

(1) That this association deeply regrets that our director, Mr. Thomas Beall, has been prevented from being present at the present meeting, owing to illness and death in his family, that we have missed his valuable assistance in our discussions.

(2) That this Association extends to the family of the late Charles E Woolverton our heartfelt sympathy, and that we hereby record our appreciation of the valuable services he always rendered to the cause of fruit culture.

(3) That this Association would hereby tender to Mr. L B. Rice, Port Huron, the esteemed delegate of the Michigan Horticultural Society, our thanks for his valuable address and that we have highly enjoyed his presence at this meeting.

(4) That this Association hereby returns thanks to the Mayor and Council and people of Brantford for their welcome and the use of their Town Hall for our meetings, and that we assure them that they have helped us in holding one of the best meetings in the history of this Association.

(5) That we hereby tender thanks to the ladies and gentlemen who have aided in making this evening's meeting pleasant.

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(6) That this meeting of the Ontario Fruit Growers' Association desires to express and put on record its regret that this Association has not received greater recognition at the hands of the Dominion Government in connection with the recent Paris Exposition.

Considering the important work that this Association is doing, the wide scope of that work; and considering especially the services that it rendered in collecting the fruits of this province for the exhibit made at Paris, and the splendid contributions which its members individually and collectively made to that exhibit, which attracted the attention and admiration of all the nations of Europe, we regret the apparent oversight on the part of the Department of Agriculture at Ottawa, that a representative was not chosen from among the officers or members of this Association or some one directly in touch with the fruit growing interests to represent these interests at the said Exposition; nor was this Association consulted in the choice of any representative sent to the said Exposition to represent the interests of Canadian fruits and fruit growers there.

Furthermore; in view of the Pan-American Exposition to be held in the city of Buffalo during the coming summer of 1901, and considering the importance of making a large and attractive display of Canadian fruits at that Exposition, we deem it in the interest of the fruit growers of Canada generally, and due to the exertions and influences of this Association that some active fruit grower recommended by its executive should be chosen and appointed by the Department of Agriculture at Ottawa, or by the Agricultural Department of Ontario, or by both conjointly, to take charge of such exhibit of Canadian fruit as may be made there.

INSPECTION OF FRUIT.

Mr. A. H. Pettit, presented the following report of the Committee on Inspection:

We, your special committee to whom was referred the question of legislation to prevent fraud and misrepresentation in the packing of fruits, beg to recommend that Bill No. 127, as submitted at the fifth session, eighth Parliament of Canada, be so altered and amended to read as follows:—

Fruit Marks Act.

1. This act may be cited as the Fruit Marks Act, 1901.
2. This act shall come in operation on the first day of July, 1901.
3. Every person, who by himself or through the agency of another person packs fruit in a closed package intended for sale, shall cause the package to be marked in a plain and indelible manner before it is taken from the premises where it is packed;—(*a*) With the initials of the Christian name and the full surname and address of the packer; (*b*) with the name of the variety, and (*c*) with a designation of the grade of the fruit.
4. No person shall sell, offer, expose or have in his possession for sale any fruit in closed packages unless the name and address of the packer is marked upon the package in a plain and indelible manner.
5. No person shall sell, offer, expose or have in his possession for sale any apples or pears packed in a closed package which is marked the grade A. No. 1 Canadian, unless such fruit consists of well grown specimens of one variety, of normal shape and not less than ninety per cent. in each package free from scab, worm holes, bruises and other defects, properly packed and marked in a plain and indelible manner with the minimum size of the fruit in inches (or fraction thereof) across the core of the apples or pears as the case may be.
6. No person shall sell, offer, expose or have in his possession for sale any apples or pears packed in a closed package upon which is marked the grade No. 1 Canadian, unless such fruit consists of specimens of one variety, sound, of fairly uniform size and not less than eighty per cent. in each package free from scab, worm holes, bruises and other defects, properly packed, and marked in a plain and indelible manner with the minimum size of the fruit in inches, (or fraction thereof) across the core of the apples or pears as the case may be.
7. No person shall sell, offer, expose or have in his possession for sale any fruit packed in a package upon which is marked any designation of size, grade or variety, which falsely represents such fruit, or in which the faced, or shewn end gives a false representation of the contents of such package; and it shall be considered a false representation when more than fifteen per cent. of such fruit are substantially smaller in size, or inferior in grade to, or different in variety from the marks on such package, or from the shewn or faced end of such package.

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8. Every person who, by himself or through the agency of another person, violates any of the provisions of this Act shall, for each offence, upon summary conviction, be liable to a fine not exceeding one dollar and not less than fifty cents for each package which is packed, sold, offered, exposed or had in possession for sale contrary to the provisions of this Act, together with the costs of prosecution, and in default of payment of such fine and costs, shall be liable to imprisonment, with or without hard labor, for a term not exceeding one month, unless such fine and the costs of enforcing it are sooner paid.

9. Whenever any apples or pears packed in a closed package are found to be falsely marked, any inspector charged with the enforcement of this Act may efface such false marks and mark the words "falsely marked" in a plain and indelible manner on such package.

10. Every person who wilfully alters, effaces or obliterates wholly or partially, or causes to be altered, effaced or obliterated, any inspector's marks on any package which has undergone inspection, shall incur a penalty of forty dollars.

11. The person on whose behalf any fruit is packed, sold, offered or had in possession for sale. contrary to the provisions of the foregoing sections of this Act, shall be *prima facie* liable for the violation of this Act.

12. It shall be lawful for any person charged with the enforcement of this Act to enter upon any premises to make an examination of any packages of apples or pears suspected of being falsely marked in violation of the provisions of this Act, whether such packages are on the premises of the owner, or on other premises, or in the possession of a railway or steamship company; and any person who obstructs or refuses to permit the making of any such examination, shall, upon summary conviction, be liable to a penalty not exceeding five hundred dollars and not less than twenty-five dollars, together with the costs of prosecution, and in default of payment of such penalty and costs, shall be liable to imprisonment, with or without hard labour, for a term not exceeding six months, unless the said penalty and costs of enforcing it are sooner paid.

13. In any complaint, information or conviction under this Act, the matter complained of may be declared, and shall be held, to have arisen, within the meaning of Part LVIII of *The Criminal Code*, 1892, at the place where the apples or pears were packed, sold, offered, exposed or had in possession for sale.

14. No appeal shall lie from any conviction under this Act except to a superior, county, circuit or district court, or the court of the sessions of the peace having jurisdiction where the conviction was had; and such appeal shall be brought, notice of appeal in writing given, recognizance entered into, or deposit made within ten days after the date of conviction; and such trial shall be heard, tried, adjudicated upon and decided, without the intervention of a jury, at such time and place as the court or judge hearing the trial appoints, within thirty days from the date of conviction. unless the said court or judge extends the time for hearing and decision beyond such thirty days; and in all other respects not provided for in this Act, the procedure under Part LVIII of *The Criminal Code*, 1892, shall, so far as applicable, apply.

15. Any pecuniary penalty imposed under this Act shall, when recovered, be payable one-half to the informant or complainant, and the other half to Her Majesty.

16. The Governor-in-Council may make such regulations as he considers necessary in order to secure the efficient operations of this Act; and the regulations so made shall be in force from the date of their publication in *The Canada Gazette*, or from such other date as is specified in the proclamation in that behalf.

17. Wherever the term "closed package" occurs in this Act, it shall mean one in which the contents are invisible and that cannot be opened and reclosed without material damage to said package.

The word "packer" when used in this Act shall mean the person on whose behalf any fruit is packed.

Mr. McKinnon: I move that the words "packed in a closed package" be struck out of section 7.

The Secretary: I would second Mr. McKinnon's motion. I think it is all right.

Mr. McKinnon's motion was put and carried as regards clause 7, to leave out the word "closed," allowing the words to stand, "packed in a package."

The motion to adopt the report as amended was put and carried.

APPOINTMENT OF INSPECTORS UNDER THE ONTARIO ACT.

Mr. McKinnon moved the following motion in reference to appointing Inspectors for the Ontario Act, which was carried: "That in the opinion of this Association the successful operation of any Act for the prevention of fraud in the packing of fruit will depend almost wholly upon the competency and character of the officers appointed to enforce it. That this Association, therefore, without wishing to interfere with the legiti

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mate patronage of the Government of Canada, hereby memorializes the said Government to consult the Executive of this Association with regard to the appointment of any such officers acting within the Province of Ontario." Mr. Elmer Lick was appointed to represent the Association at Ottawa in conjunction with Mr. E. D. Smith, M.P.

FRAUD IN THE SALE OF FRUIT.

Mr. CASTON: I have a motion memorializing the Ontario Legislature to enforce the Act to prevent fraud in the sale of fruit.

The motion was seconded by Mr. Murray Pettit and carried as follows:

"Resolved that the Fruit Growers' Association of Ontario do memorialize the Legislature of Ontario as to the necessity of providing some machinery for the more effectual enforcement of the Act for the prevention of fraud in the sale of fruit."

SAN JOSE SCALE.

BY PROFESSOR W. LOCHHEAD, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

The San Jose Scale question has reached a very acute stage, and something has to be done. The first point I wish to impress upon you is that the remedies are before you for the regulation of the Scale. I do not mean that it is likely to be exterminated by any means of that kind, but we have materials at hand by means of which the scale may be controlled. It will never be controlled unless some systematic effort is made by the fruit growers or by the Government. The present practice of allowing fruit growers, or the owners of orchards that are infested, to spray according to their own wish, virtually, will not get rid of the Scale. I maintain you might as well throw water into a sieve. You know the life history of the Scale. You know that trees that may be treated in the spring may have comparatively few Scale left, and by the 1st of August the trees may be comparatively free from Scale, but if your neighbors' orchards are badly infested, then by the first of October, or middle or end of October, your orchard will be as bad as your neighbors', virtually. You know the agencies which are at work disseminating the Scale. These are the winds, the birds, and the fruit packers themselves. I think it is better for this Association to deal with this matter and to impress upon the Government that some systematic effort should be made to keep the Scale in control. You should impress on the Government the necessity for a more rigid inspection. The Government, I think unwisely, left off the work of the inspection of the orchards last season, a season and a half now, and I know for a fact the Scale has spread to other parts of which we had no idea at the time. A competent corps of inspectors should be kept at work, and the orchards which were infested should be looked after. Then the Government should pass some measure which would compel the owners of orchards either to spray their trees, or to pay for the spraying of the trees when done by the Government (Hear, hear) That is the only way I see that the Scale can be kept in control. The Scale has spread terribly this last summer, and we have reached a crisis, and I would urge upon you to do everything in your power to persuade the Government to help you in the matter. You cannot work it yourselves; you must have Government intervention in the matter. Whether the Government is prepared to supply soap at the same rate as before I do not know, but it would be a good thing to continue it another year at any rate, and to provide a corps of Inspectors, and to see that the soap is up to the mark. I think we should back up the officials in this matter. We have been blamed for not furnishing a suitable remedy, but as I told one of your members, we are as up to date as any state in the Union. There is no state more successful than Ontario. The State of Ohio has appointed an Inspector and given a large appropriation to see that orchards are inspected and treated with whale oil soap, which we believe to be the best and most efficient, and any trees that are not treated by the owners when found to be infested are sprayed by the officials and the owner is compelled to pay the cost of the work. In New Jersey the Scale is a very serious pest and has been for years, the infested districts there being much worse than

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ours, but the fruit growers there have not given up hope; they are treating every year. They have tried many remedies, and they maintain that the crude petroleum is the most effective. Professor Smith has recently shown that the successes and failures of the recent petroleum experiments in New Jersey are traceable to the standard of the oil which has been provided. Where the oil fell below a certain standard, tested by the hydrometer oil test, it resulted in either death to the trees or life to the scale; but where the oil was above a certain standard then it almost uniformly succeeds. Of course he does not mean that it was eradicated by any means, but simply that the fruit growers can, by persistence in spraying, get a good crop of fruit upon a tree.

Mr. McKinnon: What is the average cost of spraying in the States for a full grown peach tree, say?

Prof. Lochhead: I would not positively say. Professor Smith says in his report that a pint and a half of crude petroleum is sufficient for an ordinary sized peach tree.

The President: How often do they spray in a year?

Prof Lochhead: I understand just once.

The President: Are there any cases where they have been successful in saving an orchard?

Prof. Lochhead: Oh, undoubtedly. Professor Smith mentions in his report an orchard which the owner thought was beyond redemption, that this year gave a splendid crop of marketable fruit after treatment with the crude petroleum.

The President: The supposition is, then, that it will have to be continued year after year?

Prof. Lochhead: Yes, I hold out no hope that the scale can be kept in check by a single spraying this year, and not needed next year. It must be continued year after year.

FIGHTING THE SAN JOSÉ SCALE.

By George E. Fisher, Freeman.

I endorse all that Professor Lochhead has already said in regard to this matter. You will remember that at the beginning we made a general inspection in the fruit sections of the country, and afterwards, finding the Scale upon some young trees, went to the nurseries, and found the Scale in the nurseries, and got a list from every nurseryman, which list occupied sixty pages of foolscap, and we followed the trees that were indicated by this list over the country, from one end to the other, and found the Scale in a hundred different places. Those trees were taken out and destroyed. Subsequent examination revealed the Scale in thirteen places, and still later examination in ten places, so that these ninety places appear to be clean at the present stage of the work. This occupied the whole time from the first of October to the close of the year, and the men were driven in by heavy snow storms, and the sudden change to cold weather, and they came in with frozen ears and noses, and the weather made it impossible to continue the work at that time. On the 12th January we went into the nurseries and we made an examination of all the nurseries of the Province of Ontario; we examined four millions of trees, tree by tree—not as it was done on the other side, where an inspector goes through, taking a number of rows, or perhaps takes a walk around a block. The Scale was located in seven nurseries, and a very large number of trees were destroyed to destroy a very small amount of Scale. You will learn from this what a deluge of scale the country has been saved from by this work. I have every confidence in the work that was done in the nurseries. I believe our nurseries are very clean at the present time. At the beginning it was thought that there was only a little Scale in the country, and that the proper way to dispose of that Scale was by burning; and from my experience and what I have learned since I fully endorse the course that was taken. (Hear, hear), I think it was the only right thing to do. But in the course of our work we found that the Scale had spread beyond what was supposed, and that to continue destruction by burning would necessitate the destruction of a very large percentage of the trees in some of the large fruit sections, which was not considered practicable; it was therefore thought desirable to resort to remedial measures. Then, at the suggestion of the Minister

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last winter, we endeavored to get material here in Ontario. Soap manufacturers in St. Catharines, Hamilton and Toronto were consulted, and nobody was in a position to supply us, and they did not know where to get the material, and so we had to go outside of the country last year, which would not be necessary again. The feeling among the people last year was that whale oil soap was a safer remedy than anything else, and was perfectly reliable. The reports that have come to the Department from those that had visited infested sections would lead to that conclusion; but I have learned that in treating orchards the Scale had not sufficiently recovered its ground, by the time that those inspections were made, to enable those who made the inspection to know very much about the real condition. The Commission which went through this country in June and July, and went to Catawba Island, and returned from there reporting that the soap was a satisfactory remedy, had very little opportunity to know from examining the trees at that time of the year. The Scale remaining alive after the application had not sufficiently multiplied to make their presence very conspicuous, but during the months of August and September and to the middle of October they multiply very rapidly indeed, and when I went to those places in October I found the Scale on those trees without any trouble. There is no reflection cast on the early examination

Mr. McKinnon: Weren't these trees being seriously injured when you saw them last?

Mr. Fisher: I will come to that a little later. As regards the effectiveness of the soap, we got what we then and still supposed to be the best soap available. It was distributed to those who would undertake to do this work, with the understanding that they would do it according to instructions provided, which required that the soap should be applied to the tree in the strength of two pounds to the gallon of water when the trees were infested, and a pound and a half of soap to the gallon of water in cases where there was no Scale known to exist, and it should be applied to the tree until all parts of the tree were covered; but in subsequent examination, on knowing how much soap had been received by the growers and the extent of orchard treated, we found that the soap had not been used in sufficient strength in the mixture, and early in the season, when the soap was still to be seen on the trees, we could tell from that, that it had not been applied thoroughly, because some portions of the tree would show the soap and other portions would not, and a little later on, these portions where the soap had not been applied were breeding quantities of Scale. It was quite easy to see that the work had not been thoroughly done. Under such circumstances as these it was not surprising that the work was not satisfactory. But quite a number of persons did not do the work thoroughly, using the full quantity of soap and applying it as well as they could, wetting the trees all over, and in such cases—especially in the cases of trees that had become encrusted, where the Scale had become plentiful and encrusted so that there were several layers of the Scale to be saturated by the application, the results were very disappointing. We did some work ourselves, in order to be satisfied about the value of the remedies, and we have no example in which we can feel that we have materially reduced the Scale on any tree. This work was done with the whale oil soap. When I say this, I mean that the condition at the present time is not better than it was a year ago. Of course the application has been a very great check upon the Scale, and had these bad trees not been treated they would have been encrusted with the Scale by this time, and as it is they are in just as good a shape as they were when the treating was done generally. And that condition prevails throughout the country. It seems to me that there is a condition essential to any remedy which is used on trees for the destruction of insects, and that condition is that the remedy shall remain soft on the trees for a very long time. Crude petroleum is as near the condition as we can get. It will remain weeks, and even months, in a free condition on the trees. Now, soap that will remain on the trees in that condition I am sure will do good work, and I am sure also that the soap that we used this year was made from somewhat lower grade materials than are necessary; that is, better grades of material should be got. I went to Catawba Island this fall, and made a pretty careful examination into the conditions there, because I found opinion very much divided. Some people there are still a little afraid of the oil, but a great many of them feel that they must abandon the use of soap for crude petroleum. Some of them say that they have used whale oil soap on their trees for three or four years in succession, and that while this has been going on the Scale has increased to such an extent that the trees are

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very much worse at the present time than they were at the beginning of the treatment. In fact some of them say that some of their trees in their orchards are weakening under the attack of Scale, but from what I have seen in our own work, I cannot see that the Scale is likely to increase where the work is well done; I think the soap will keep the scale down in those orchards to what it was when we began. There is, of course, always an opportunity of it spreading. Spreading goes on very quietly, and we don't know very much about it. That is one of the most difficult features in the work. It has been found in a great many orchards in which it was not found a year ago. It may have been in those orchards. I found the same conditions in regard to soap all the way through. The price of material has increased, and the tendency has been to use a grade of material that would enable soap makers to sell at old prices, and soap is none to good, at best, and in order to do good work it is necessary to use the very best material. In Ohio I do not think they favor whale oil soap in the government work. They think that a whale oil soap can be made that will kill the scale, and that whale oil soap reaches it and holds it in check, and that it is sufficient to use on the trees. They regard the other remedies as unsafe. The effect of whale oil soap on the trees in regard to cleaning them up is very marked indeed. We found that the crude petroleum would not distroy leaf-curl; whale oil soap used at half strength is just as effectual in destroying leaf-curl as when used at full strength. Another little experiment which I thought very nice was that we ran off some ordinary lye from ashes from the leach, and that was put on several rows in a young peach orchard, and the leaf-curl did not put in appearance on those rows, while the balance of the orchard was so badly affected that almost all the foliage came off. The spraying was done immediately before the buds opened. That is the time which seems to be the most propitious, when it seems to be the most destructive to the insects and the least injurious to the tree; it does not seem to make any difference whether you are using whale oil soap or crude petroleum or what you are using, the tree, because of its greater activity at this time of year, has more resistance, and because of the greater activity of the Scale is more susceptible to injury. But we have in Ontario some very good examples of the use of crude oil.

I will refer to some trees that were treated at Titterington's, in St. Catharines. There were nine trees treated. Three of them were supposed to be treated with 25 per cent. of crude petroleum with water; three with 33 1-3, and three of them with 40. We had a pump with one valve drawing from two chambers, and the quantity of material was supposed to be regulated by the size of the aperture. This we tried for a while, but found that it would not give us the regular quantity, and then we tried kerosene and water, which was very satisfactory as far as the positive action went, but the behavior of the mixture in the hose was very disappointing, and that was abandoned. The London people are making a pump which, as far as I have used it, has been very satisfactory indeed, and I think you can depend upon that London Spramotor combination pump as reliable for making a mechanical emulsion of either kerosene and water or crude petroleum and water. It seems to work very nicely where it is used carefully; but oil and water are so different in gravity they seem to be a very slippery combination, and you have to use a good deal of judgment and care in applying them. And right here I would like to caution those who will use this emulsion, about spraying any portion of the tree more than once. We will assume that you are trying to put on an emulsion of 25 per cent. of oil with water. If you allow the nozzle to pass several times along the portion of the tree, you are putting on 25 per cent. every time the tree is covered with the nozzle, and in putting on this percentage you are endeavoring not to allow the nozzle to cover any portion of the tree more than once, and in order to make thorough work you should be very careful about doing the inside or upper side of the limb on the opposite side of the tree from where you are standing. But I have got away from those trees of Mr. Titterington's. We had a number of trees treated with soap. There were four or five different kinds of soap used there, with no good results from any of them, inasmuch as the Scale on the badly infested trees was very much more plentiful this winter than it was last. There are nine trees treated with crude petroleum, and it is almost impossible to find a single specimen of the Scale on those trees. They stand very near together, and the comparison is very marked. One of these trees treated with crude oil has a limb which is badly infested. Now this limb serves the purpose of showing that that was a badly infested tree when it was treated and it also shows how easy it is to miss a portion of a tree. I think any of you who

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would visit Mr. Titterington would be very much pleased for having made the visit. The crude oil is a perfect remedy so far as the destruction of the Scale is concerned—almost perfect but not quite. There are always some left as far as we know, for out on the young growth on those same trees you will find a live Scale. There is a marked difference, however, between the oil and the soap in the resistance of re infestation even when recently applied. I found some trees in August and I applied soap with a whitewash brush to several of them, the trunk and large limbs, as far up the top as I could go without going into the foliage. The Scale was perfectly killed up as far as I went. Above where the treating had gone the Scale increased so that the top of the tree was entirely encrusted, a very marked increase, and I think that you may take that as a fair example of the increase of the Scale this year on infested trees. You could scarely find a bit of bark that was exposed to view on those trees, and at the time of their treating on the 18th of August the Scale was only in such quantity as you would understand when I tell you that it was nicely peppered over—that is the way that we speak of it among ourselves. On the lower portion of the trunk the condition remained much the same as when the soap was put on. Between that and where the soap was there was a great deal of re-infestation. The Scale had come down from above, where the treating was done, and had fixed right there on the soap within a month, and had come to maturity, and had given birth to young that had fixed in the neighborhood of their mother. The breeding seemed to go on on the top of that soap just about as well as anywhere else; but it is different with the crude petroleum, because no Scale can fix themselves or live on it. I can take you to trees that are badly infested that were treated with crude petroleum in the spring of the year; the Scale remained there just as it was when the oil was put on them, but all dead, and there is nothing alive on the main branches or large limbs of the tree anywhere; the only part of the tree that has been treated with oil that you will find live Scale is some portion of the tree that has been missed or out on the young growth beyond what was present when the treating was done. There is that difference between the oil and the soap. I have endeavored to ascertain what Canadian oil is like and to compare it with what is necessary for such work, and the result is that we have no oil in Canada of sufficiently light specific gravity to be suitable for the purpose. Professor Smith says in his Bulletin that oils that show a specific gravity of less than 40 are not fit for this work. There seems to be too much paraffine in such oils, which has the effect of closing the pores of the bark, and the trees die apparently from strangulation. I have had a good deal of trouble in getting a hydrometer suitable for testing oils, and I have brought one here to show you that I got at Mr. Potter's in Toronto, and I made enquiries at a great many places before I found anything as suitable as that. You notice that the specific gravity is ascertained by placing this instrument down into the oil, and the lighter it is the further down into the liquid the oil will go, and consequently register a higher degree. If it is heavy it will stand up so that probably 35 to 40 would be the specific gravity of a heavy oil. Now that has to be taken at a temperature of 60 degrees. Well, here is a thermometer arranged so that you can test the temperature of the oil, and it is also arranged that if the oil registers a greater or a lower temperature than 60 degrees you add or subtract according to the condition.

Mr. MORDEN: What does water 60 degrees register in that?

Mr. FISHER: I have forgotten the decimal, but water is a heavier fluid than oil.

Mr. MCKINNON: The water, I think, is 100 per cent., and then the oil is measured in terms of water.

Mr. FISHER: Well, that does not show those terms. I have seen instruments that do, but it is not necessary to determine that at all for this work, and having the thermometer in connection with the hydrometer makes it very convenient for testing oil at any temperature.

Mr. LICK: That is specially for coal oil?

Mr. FISHER: Yes.

Mr WHITNEY: Are you aware that the crude oil on the Pacific coast does not contain paraffine, simply asphaltum? They cannot make illuminating oil from it; it is used for asphaltum pavements and for fuel. It struck me that perhaps that kind of crude oil would not be open to objection.

Mr. FISHER: Well, I fancy that if the paraffine were entirely absent the quality of resisting re-infestation would also be absent, because is it not the paraffine remaining on

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the trees in small quantities that saves the tree from re-infestation? I think it is. We are not quite sure that Professor Smith is altogether correct in what he says about the proper condition of oil, and for that reason I think that we should try our best oil with care, and if we are not satisfied to use it in the condition in which it comes from the ground, I am told by chemists that we can bring it to the same condition in which it was found in lighter fields by taking the best oil we have and adding the lighter elements—putting in benzine and kerosene in sufficient quantity to bring it to the proper consistency. Now there are a number of questions asked in regard to the oil. A great many people are afraid of it. I have never seen a tree injured by soap, although the soap is very destructive to fruit buds if applied in the winter. If applied before the frosts are over it will certainly kill all the buds on your peach trees. It is well to remember that. But the crude oil is less destructive to fruit buds than soap, but it has been found to be very destructive to the trees. In some sections a great many trees have been killed by it, and in other sections individual trees

Mr. Morden: Do you use it in April?

Mr. Fisher: Yes; but not in winter, as I think it will destroy the fruit buds. That has been our experience. If you use it after the frosts are over you will be less likely to injure the fruit buds.

Mr. McKinnon: Will it injure the fruit buds of other than peach trees?

Mr. Fisher: Well, I put some on my own trees last winter and the buds were not injured at all on apple trees. I have some apple trees that bore a good crop of fruit, and did not seem to be any the worse for the application of oil.

E. D Smith: Does the oil damage the tree as badly one season as another?

Mr. Fisher: I think not. I think it is a great deal better to apply the oil in April. I would apply anything in April, no matter what it is you are using. For a winter application I would apply it in April. A question has been asked me very often that I have not been able to answer until I came back: how would the trees be if treated with crude petroleum for a succession of years? And I found one or two instances of that in the course of my trip through the United States, and it all goes to show that when the application is properly made the trees will improve under it. There is an instance in New Jersey where I had some very badly infested pear orchards, that were exhausted through the Scale, that he had been using remedies a long time, and that since the advent of crude petroleum as an insecticide he had so reduced the Scale in his orchard that the trees had recovered their vigor, and last year had borne a good crop of fruit, and are now giving promise of another crop of fruit next year. I think you may accept that. It does not really make any difference whether you use the petroleum diluted or undiluted, because when you use it diluted the water is soon gone and the oil remains. The advantage of the water is merely to assist in distributing the oil so that you can entirely cover the tree with a smaller quantity than you would probably do if you were using the undiluted oil; but those people down in New Jersey, where they have used the oil the longest, say that they prefer to use the undiluted oil because they know what they are doing; they have no pump that they can rely on to give certain results, and most of them have been using the oil undiluted lately.

E. D Smith: But now you say that there is a pump that will give a perfect mixture?

Mr. Fisher: I think that pump will give good results, and with the use of water you can use a smaller quantity of oil, and it is certainly safer to use a smaller quantity of oil, and a very small quantity appears to be all that is necessary to destroy the Scale, and that would make the operation cheaper. At Washington I met Professor Johnston, who has been using hydrocyanic acid gas in the orchard on an extensive Scale. He uses a box tent, and claims to have entirely cleaned up 2,000 four-year-old peach trees at an expense of six cents per tree for material and labor. Now, this is not expensive, and if the work can be done at this expense I think it very desirable that fumigation should be carried on here, for the reason that fumigation is much more destructive to insect life and is more searching than any remedy that is in use. It is the last live Scale we are after; that is the chap—(A voice—"That is it")—the one that remains to re infest the tree, and the trouble with the soap is that it leaves too many alive—that is the only trouble. It is a beautiful thing on the trees wherever it is used; the trees look 50 per cent. better; the foliage is large and fine and the fruit is good You almost ensure a crop of fruit. It may be looked upon as a perfect remedy against this leaf curl, and I certainly like soap. But

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when it comes to San Jose Scale it certainly appears from our experience that it leaves too many alive. The hydro-cyanic acid gas gets after the Scale. Some people claim that in some cases it does entirely clean up orchards, but I do not think we can be very sure about that, though it is altogether the most certain to destroy Scale of the remedies that are in use, and if it can be used at an expense of 6c per tree on four-year-old peach trees it is not by any means expensive. (Hear, hear). Possibly Professor Johnston is a little premature in claiming that he has done this. I met an old gentleman down in New Jersey who said he had no trouble at all to kill the Scale, he said it was nothing to kill the Scale, but he wouldn't say dead. (Laughter). Now, that remark may seem a little out at first, but it is so singularly in keeping with our experience, when we have extreme difficulty in say a month after the application is made to find a single specimen of Scale remaining alive; you may look a long time before you will find them, but they are always there, and at the end of the season they have re occupied the tree, so that thorough work in treating every Scale is very desirable. At Lakeside, Ohio, I found an orchard of 165 plum trees that was very badly infested with Scale; in fact I never saw so many trees together so badly infested. They had been treated with crude petroleum in April, and there was very little live Scale remaining on those trees. I saw them in November. I think it would be impossible to have a better example of the efficiency of the oil treatment than what was shown on those trees. From correspondence I have had I know that the oil that was used on those trees was a low grade, and I think that possibly we may be able to use our own oil if we use it with due care. A heavy oil indicating below forty is reckoned as low grade. An oil that has a specific gravity of 45, or more, is looked upon by Professor Smith as being safe. You could not have it any better no matter how light it is; it would not be any better if it registered at 45. At Titusville, Pa., there is a light oil field, I understand, where the oil all shows a specific gravity of 50, and that would be a very nice thing if we had it here. I think we could use that oil with perfect safety on our trees, but it is not here. I think the addition of refined oil to crude oil serves the purpose. I have discussed that matter with some of our chemists and they tell me that that could be done. It would be a question of expense, however. The mixture would probably cost more than it would to import oil from Titusville. I was very grateful indeed to the Minister for allowing me to make this trip down there to the United States, because it enabled me to settle some points, which I had not been able to satisfy myself upon. One point was the effect of crude oil upon trees if applied year after year, another was the result from the use of hydro-cyanic acid gas in the orchards, and another was that I might have an opportunity to consult with some gentlemen who could give me information of the existing conditions in California. I met Dr. Howard and asked him these questions, and he told me that in California so far as he knew the people were just as much afraid of the Scale as ever they were; that they have a remedy over there—salt, sulphur and lime—which is useful in their dry climate, but it would not be useful in this country because of our frequent rains, and they have learned that they can rely on this remedy to help them out, and they can control the Scale if they use it; but he said that if they relaxed their efforts for a single year the trees will soon get back to their old condition.

Mr. Whitney: Is the Scale there the same as this?

Mr. Fisher: Well, there are a great many different kinds of Scale. Last evening I received a letter from a gentleman in Redlands, Cal., who says that one reason why the Scale is not quite as bad in Southern California as it used to be is that they have abandoned to a very great extent the cultivation of deciduous fruit trees, and that the room has been replanted to citrus trees. Now, the citrus tree is infested with an entirely different Scale, it is a red Scale. It is very similar in appearance to the San Jose Scale, but it is different.

Mr. Morden: I have understood that there is a parasite that is operative in California, but that does not care to come so far north to help us.

Mr. Fisher: I will now deal briefly with a few other features of our work. We have already referred to the effect of soap on the trees. As to the effect of oil on the trees, I may say that where the oil has been applied freely the trees will not leaf out for from one to two weeks after they would have leafed out, and we are very apt to think that we have finished them; but they will come on shortly after that, and the leaves will be very large and rank in color, very much in excess of the usual size of the foliage, and they remain through their holes and the perforations of insects that have been killed by

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the oil that has been put on the trees. I have found on several occasions the bud moth and the case bearer in considerable quantity on trees that had been treated, and the leaves on those trees remained entirely free from the mutilations which would have otherwise occurred. This foliage, too, will be retained much later in the fall. The leaves do not come off the trees quite so soon at the end of the season. The injury that the oil occasions to the trees is almost invariably the result of excessive application, as far as I could understand. In regard to the fumigation of trees, I understand that Professor Forbes, in Illinois, has declared against this in orchards as being impracticable. Well, in the last Bulletin that I have seen from California, they say that is altogether the most thorough and satisfactory way of treating trees, and in a letter that I received yesterday reference was made to the fumigation as being the only way that you can satisfactorily treat badly infested trees. It is my wish that there should be some fumigation done here in Ontario that we may see with our own eyes what results can be accomplished by gas. I have been frequently asked what a person can do to protect his orchard that is not infested—what an owner can do to strengthen his position. I think it is very desirable indeed that as great a degree of fertility be maintained in orchards as is possible to have, and in this way you can make your orchard very much more resistive to the attack of Scale than they otherwise would be. The limit between what a peach tree and a Japan plum tree will stand, and what is necessary to kill the Scale, is narrow compared with that in the case of apple and pear trees, consequently these varieties of trees are more hard to treat, and there should be special pains taken to keep up the vigor of a peach orchard, in an infested section especially. This is good practice in any case, but especially in the case of Scale. I have had several examples of the desirability of doing this in orchards, parts of which were so badly infested that the trees were encrusted. The Scale went on increasing all through the fall. An applicatien of crude petroleum, 25 per cent. in water, was made the following February, and almost every tree that was encrusted with the Scale was killed by the oil, while the balance of the orchard which was not badly infested by the Scale was not injured by the oil, but bore a full crop of fruit. One row along one side of this lot was sprayed with undiluted oil and it did not differ in the least from the rows that were treated with 25 per cent. That is, the pure crude petroleum did no harm. I think it is very important that there should be no trees allowed to become badly infested. This is one way in which I would hope to maintain vigor in a peach orchard. The principal breeding season is during the two months from the middle of August to the middle of October, and especially during September. You can readily understand that fruits that ripen before this time in treated orchards are not likely to be infested with Scale, while those that have to remain on the trees until after the principal breeding season is over are likely to be attacked by the Scale; those late ripening fruits are the fruits that the Scale get on, and as early in the season as it is practicably to do so I would like to fumigate those infested trees, whether they be many or few. This is done with a tent made in the form of a box. It is not practicable for very large trees. The size of Prof. Johnson's tent is 5 x 5 x 7 feet. They are square boxes—canvas tacked to a frame; and then there is a hood that rolls up to the top so that if the branches at the top reach up higher than seven feet this hood will allow of it going up and still confining the gas above them. He uses the gas process in destroying the Scale in Maryland to a considerable extent. Prof. Lowe of Geneva, has another kind; it is just the same style of a box, and one side is open. The box is much larger, made in the same proportions, and he gets it over the trees by removing the open side and slipping the tent up and against and around the tree, and then setting in the side and fastening it to its place by buttons. I think that this can be done very nicely. and I will urge the Minister to allow a certain amount of fumigation here in Ontario, that we may understand whether it is for our advantage or not. I am sure that you are all assured of the interest that the Minister feels in this work. I have myself been frequently surprised at the remarks that he has made, and I am in a position to say that he takes a very deep interest in the Scale work. He feels that the interests of the fruit growers are threatened materially, and he would like to do anything he can to assist them, as is evident in many ways, and the pains that he has taken to get information of what is being done in other sections, so that what we do may be right along the most up-to-date lines, and the manner in which he has responded to the call of this Association from the first agitation that there was on account of the Scale.

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Mr. MORDEN: Are there any hopes of any parasites that will be useful in Canada? We know the lady-bug will do something.

Mr. FISHER: I am afraid not. Wherever I have been they told me there does not seem to be any material advantage from either rapacious or parasite insects. Trees in Ontario were very well supplied with the lady bird last fall; some trees were swarming with them.

Mr. CASTON: But those do not keep over the winter?

Mr. FISHER: No, they have been so reduced that they do not become plentiful until late in the season again, and by this time the scale has recovered and has far exceeded the condition in which the lady bird left them at the beginning of the previous winter. In regard to these parasitic insects, Prof. Johnston, of Maryland, seems to think that he has found one there that is likely to be useful. It is a fly, a regular parasite, and he suggests that the trees should be pruned before they are fruited, the brush should be covered up and removed but not destroyed until immediately before the scale begin to breed, so as to give these parasites an opportunity to get back on to the trees. The treating of trees after this brush is removed will destroy all of those parasites that remain on the trees, and the only hope of retaining any is by holding the brush as long as possible so as to give them an opportunity to go back on the tree. I understand that in California where they have trusted to insects they have lost their trees; and the further north you go the less hope there is from preying insects; we are not so well situated here as they are in California.

The PRESIDENT: Does this parasitic fly that you would save by pruning, live over winter?

Mr. FISHER: It lives over winter on the trees, like the Psylla, and there is likely to be some of it on the brush, and he wants the trees pruned and the brush removed before the trees are sprayed, and left as long as it is safe to leave it. They breed very rapidly and at different points in Maryland It becomes a winged insect and has much the appearance of the male Scale.

The PRESIDENT: Mr. Fisher has purposely abbreviated his remarks in order that you may ask questions.

Mr. MORDEN: He has not given us just the appearance of this to a good eye, or to the ordinary magnifier, that we might distinguish it from other Scales.

Mr. FISHER; Well, I do not think that it is possible to distinguish the larva of one Scale from the larva of another, only perhaps by the color. The Forbes Scale is a little bit like it—a light lemon color—and I do not know of any other Scales that have quite as much color as the San Jose. They are very small of course; it takes about 110 or 111 of them to measure an inch when they are put end to end, but you can see them quite distinctly with the naked eye. They run around upon the trees about five or six or seven days according to circumstances. They may fix it sometimes in a shorter time than that, and when they put in their little beak and begin to suck there is a wax starts out from their body, and that, in connection with the cast off skin of the several moultings, forms their home. This is called the cover Scale. Now, the cover Scale of the San Jose Scale differs from the cover Scale of other insects in the distinct dot and ring; you will not find so distinct a ring and nipple in any other Scale as you will find in the San Jose. This in itself is a sufficient guarantee, almoqt, of the species.

MURRAY PETTIT: Under ordinary conditions how long from the time a tree is first infected until the fruit is of no value?

Mr. FISHER. Well, we have not had experience in that. The badly infected orchards were all destroyed at the beginning of the scale work. The Minister was so anxious that the Scale should be destroyed, that there should be no distribution, that the first thing we did was to go right at it and we burned it up, and there was not any evidence left, and the people did not believe that it could do any harm. I believe the greatest mistake we made was to burn up all of that Scale. If we had left a bad orchard to die before our eyes it would have had a very good effect. The people did not believe the Scale would destroy the trees, so that we really have not a great deal of evidence. But I have seen trees that were not known to be infected in the year 1898; in August, 1899, there was one limb found to be infested on a peach tree, and in August, 1900, half of that tree was dead, the leaves were off on one side and we changing color on the o her, and the peaches remained on the limbs and shrivelled and dried. Here is an instances of a tree in which

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Scale was first found in August, 1899, and during the season of 1900 that tree failed to mature its crop of fruit. It blossomed, and the fruit was in the early season just as good as it was on the adjoining trees; but now that tree is made into firewood, and the trees all around there as early as the middle of last summer were infested, and badly infested all round this tree, and in going through the orchard I could find Scale on every tree I looked at. That gives you an illustration of the great disposition to spread. An orchard down through the Niagara District that was known to contain from 5 to 7 per cent. of infested trees, according to an examination made in 1899, has Scale on every single tree in the whole orchard to-day. That seems to be the way that the Scale is spreading. People were surprised on every side by finding their fruit infested with Scale when they came to pick their fruit. Up to this time they did not suspect that there was such a thing as Scale around their premises. I don't wish to make a specialty of the Niagara District. It was just the same in the West. About the end of July in 1899 we counted the apple trees than were infested or that were exposed in one orchard that was reported to be very slightly infested, but upon which Scale could be found at that time; now you can look down the rows from the road as you are driving along in a rig and see the Scale on the trees; and in the orchard first mentioned in which there were Scale in 1898 you can not only see the Scale on the outside of the trees, but away down the road you can see scaly trees, and tell them by the difference in the color of the bark.

MURRAY PETTIT: Does the fruit on those trees show the effect?

Mr. FISHER: Not yet.

MURRAY PETTIT: How long had it been in Mr. Wigle's pear orchard in Essex before those trees were taken out?

Mr. FISHER: I think he said it was four or five years since he bought the trees

Mr. WHITNEY: I do not know of any Scale in the east. I would like to know how far east it has been discovered.

Mr. FISHER: In the neighborhood of Belleville there were a number of affected trees sold at low prices and distributed throughout that neighborhood. We got a list of the sales of those trees as far as we could and followed them up and destroyed the Scale in quite a number of places in the neighborhood of Belleville, in the County of Hastings, and also in the County of Prince Edward. We have not known it farther east.

The SECRETARY: I think it would be very interesting just in this connection to hear a word or two from Mr. Thonger, because it was in his orchard that we first discovered it, or it was called to our attention, and some of us are present who went down to Mr. Thonger's and found the Scale at his place, and this must have been five or six years ago.

Mr. THONGER: I have listened with very great pleasure to Mr. Fisher's lucid and systematic address, and I believe there is not a word in it but what I can agree with. Mr. Fisher is not a man to jump to conclusions at all, and I am glad to find that after three years' time he has come to about the same conclusion I came to in about three weeks with the practical experience I had. (Laughter.) He is quite right in not jumping to conclusions. When a man has not evidence to come to conclusions on he had better crawl. I do not wish to refer to the past more than I can help, except in its bearings on the present. The question is divided into two distinct issues. There is the physical difficulty in dealing with the Scale, and there is the moral difficulty in dealing with the people who think they have not got the Scale, and those that know they have got it. I think that the great mistake that has been made in this question is that the grounds of equity were not considered in dealing with the matter. I may have spoken very harshly of some people. I have suffered considerably by this issue, and I have laid the blame of the action that has been taken particularly on the officers of the Ontario Fruit Growers' Association. I think they jumped to a hasty conclusion. They thought that they had got the scale in a few places, and it was all in their hands, as it were, and all they had to do was to destroy it. I do not think sufficient attention was given before that Act was passed to see how far the scale had spread in the country. The conclusion I came to before the Ontario officials came out there at all was that the condition of my orchard was very likely to be the condition of every orchard in the country. I had no reason to believe otherwise. I could not trace the introduction of the scale to any particular trees in my place. They were just as prominent on the old trees as the young trees, and I came to the conclusion that it must have been imported in

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trees in orchards that were far older than mine were, and the owners had never noticed it. I should not have seen it but I was going through an orchard of pear trees which I pass almost daily, and on one of them I noticed something like a fungus growth which did not look very nice, but I did not take particular notice of it. I passed again and found it was spreading, but I was not thinking about the San José Scale at all. I thought we were so amply protected by the knowledge of that Scale that was threatening us that it could hardly settle on my place without the officers catching it by the ears. (Laughter.) It looked like ashes on the trees, on the trunks mainly. If the trees had been infested from the nursery it is very apt to be infested on the trunk, but on other trees I should say it was infested on the branches. These trees were infested on the trunk, I think, but I did not look carefully into it. I did not know it was so excessively small. The next spring it was badly spread again and I asked the men who were working among the trees if they had recognized the thing at all, and they said no; and when two people did not know it I thought it must have been the San José Scale. I sent it to Niagara and they sent it to the *Rural New Yorker* to see what it was. A great many people censured me for saying anything about it. In a few days I heard from Mr. Fletcher at Ottawa. He wanted to know how many trees I had infected. I knew very little about it. I did not know how it spread. I did not know whether it had eggs or how it did, and I sent him a few samples and things I found on the trees that I thought might be it. Well, they were not it. I examined the trees the year after this and found it had spread considerably more than the year before. I pruned my trees considerably, and after that I made a systematic examination through the orchard, beginning on the west side and going up and down the rows. I spent three days at it and marked every tree on which I discovered Scale, so as to decide where the centers of infection were and what the state of infection was, and that would be the state of things when the committee came down to see it. I had a great deal of experience with Professor Fletcher. I destroyed some of the worst infected trees according to the recommendation. I came to the conclusion that the professor had made rather a mistake in advocating the destruction of the trees. I feel that if we cannot deal with the worst infested trees by manual treatment we cannot deal with it at all, and if we begin to burn in one corner of it we must burn in the other. I think the remedy of burning is perfectly fallacious. I think the scientists should have made the distinction that it is far better the trees should be burned than not treated at all, and I think if a person knows his trees are infested they should do everything to cure the evil for their own interests as well as that of other people. When people indulge the mania of destruction in the interests of their neighbors it is quite another thing. I wanted to get rid of the infested trees. I did not like to destroy them because I thought they were valuable property. The scale was there and known to be there, and sure to be investigated and treated and made the best of. I should have felt I was doing the Province an injury to deprive them of the advantage of treating this terrible pest. I said to Mr. Fletcher that if they did not do something soon I should have to destroy the trees. I asked Mr. Fletcher that they should place a good brand of soap on my trees at once, but they were able to do nothing. I saw the thing was so serious that Mr. Fletcher or someone ought to have come almost immediately to my orchard to see what it was and that means were taken to suppress it, and I thought the Ontario fruit growers, when they found it was in the country, would look after it at once. Their anxiety would be to know what means I was going to use to get rid of it, and if I had means to get rid of it. I think the great question is whatever measures are decided upon they must be founded in equity. The mistake was made by the fruit growers in thinking that I was among the very small minority and that it was perfectly safe to neglect my claims for recommendation of right dealing.

Mr. Morden: Was the twenty-five per cent. payment equitable?

Mr. Thonger: No; no percentage is equitable.

The Secretary: You think the whole thing should be paid for?

Mr. Thonger: Yes; the best thing would have been to leave the matter to the courts of justice, where disinterested parties would decide what the real value of the property destroyed was. The mistake of the fruit growers was that they made their societies courts of justice. They complained against the people who had property lost or destroyed, and they judged their own case when they should have left it to a court of justice to settle what the damages should be.

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APPLE BARRELS.

The SECRETARY read a letter from S. C. Parker, Secretary of the Nova Scotia Fruit Growers' Association, and introduced to the notice of the meeting two barrels, one which has been used by apple shippers for years in Ontario, the other proposed by the Nova Scotia Fruit Growers' Association, which is a smaller one, and which has been adopted by the American Apple Shippers' Association, which has declared they will not use any other barrel in foreign shipment. The Nova Scotia shippers use the American barrel, because they ship it to Boston and thus compete with the American barrels, and last year they united with us in asking that it be made the legal barrel of the Dominion. Some of us in Grimsby have been using that barrel this year, expecting it was to be made a Dominion barrel The dimensions of the barrel are: Staves, 28½ inches long; head, 17¼ inches; circumference at bilge, 64 inches. This barrel holds 96.51 imperial quarts or 100 American quarts, while the flour barrel we have been using measures as follows: Staves, 30 inches long; head, 17 inches long; holds 103 imperial quarts.

E. D. SMITH: Can you tell us whether this barrel is the only legal barrel to be used by the United States?

The SECRETARY: I do not think the Government has ever established it, but the apple shippers are the controlling factor there.

E. D. SMITH: The Canadian barrel holds about two bushels and three pecks. If the stave manufacturers don't make any trouble about it and are willing to furnish these new sizes of staves at the same price as the old ones, I should say we should use the barrel that is used by the United States and in Nova Scotia.

A. H. PETTIT: I want this barrel, on the ground that it is a better barrel. When you pile up those barrels you will find that the bilge scarcely touches. This will rest more on the bilge. Now when you pile your barrels three or four in a car and they have to teeter through to the port of shipment, they have got to be put down in the boat and run that way across the ocean, I want to know which has the prospect of getting the most damaged; fruit in the shorter barrel that rests on the quarter hoops, or the one that rests on the bilge? What are we doing in all the branches of the fruit trade to-day? We are getting smaller packages. What for? Better condition of arrival. If this barrel will give us a better condition of arrival, that is what we want. I am inclined at the present time to use the smaller barrel. I believe we will find it to our advantage in the end to do so. I notice in the reports of the Nova Scotia barrel they have not the amount of slacks that the Ontario people have. Is this the remedy? I will move "That in the opinion of this meeting it is wise to adopt the uniform standard of barrel as used in Nova Scotia and the United States."

Mr. WHITNEY seconded the motion, which was carried.

Before the meeting adjourned the following committee of the Association was appointed to consider the sizes of fruit packages that should be adopted in order to secure uniformity throughout Ontario, namely: Grimsby, D. J. McKinnon, A. H. Pettit, L. Woolverton; Winona, E. D. Smith, M. Pettit, T. H. P. Carpenter; Burlington, Wm. Fisher; Fruitland, W. M. Orr; Beamsville, S. M. Culp; St. Catharines, W. H. Bunting, Robert Thompson.

The meeting then closed.

REPORT OF THE FRUIT EXHIBIT COMMITTEE, 1900.

Your Committee on Fruit Exhibits begs to make the following report:—The fruit exhibit this year was a creditable one and the specimens shown were, most of them, of good size and shape for the varieties they represented. The apples from Niagara Peninsula were not as well coloured as usual, owing to unfavourable weather, and while those from Eastern Ontario were better coloured they also were not as highly coloured as usual. A good collection of fruit adds greatly to the interest of the meeting, and it is hoped that this good pratice will be kept up. This is a good opportunity of having the merits of new or little known fruits discussed and brought before the notice of the prominent fruit growers of Ontario.

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One of the largest collection of apples was shown by Mr. E. Morris, of Welland, Ont. Most of the varieties were comparatively new to this country, which added much interest to the exhibit. Honsley's Winesap is an apple of fine appearance and good size, but cannot compare with the ordinary Winesap in quality. The specimens of Gano shown were very fine and well coloured. There was also an exceptionally good plate of Ben Davis. One hardly recognized Salome, it was so pale, there being only slight traces of red. The specimens were, however, of good size. York Imperial and Sutton Beauty, two apples much thought of in United States, were also good. Other varieties, of not particular merit, were Dickinson, Matamusket, Clayton, Huntsman, Western Beauty, Red Riches. There were also specimens of Bottle Greening, Winesap, Swayzie Pomme Grise, Limber Twig, and Cooper's Market.

Mr. Harold Jones, of Maitland, Ont., brought some fine Fameuse and Scarlet Pippin. The latter variety does particularly well with him. It is a very handsome apple and is said to sell well. He also had some good specimens of Ontario, Ribston Pippin, McIntosh Red, and Milwaukee, the latter being a new variety of promise for Eastern and Northern Ontario.

Some fine apples from Bruce county were shown by Mr. A. E. Sherrington, Walkerton, Ont., his Ontarios, Kings, Northern Spys and Manns being all fine. They offered very good evidence of Mr. Sherrington's contention that Bruce county is the best apple growing county in Ontario.

A curiosity in the form of a seedleess apple was shown by Mr. W. A. Whitney, Iroquois, Ont. The apple was quite normal in appearance and of a good size. Mr. Whitney says that none of the apples contain seeds. Some very fine specimens of Wolf River apples were also shown by Mr. Whitney.

A collection of thirteen varieties of apples was brought by Mr. W. T. Macoun from the Central Experimental farm, Ottawa. Those of most interest were La Victoire, Spencer, Milwaukee, and Kinnaird. The first mentioned is a fine looking apple which originated near Calumet, Que. It is of good size and very regular. The quality is rather good also. Spencer is a very handsome apple but rather coarse. Kinnaird is a late keeping variety of good quality which is quite hardy at Ottawa. Milwaukee is a seedling of Duchess; a large, handsome apple bearing early and heavily and keeping until February or March.

Mr. W. C. Reid, Belleville, Ont., had some good specimens of Akin Red, Winter Banana and an other variety thought to be Rome Beauty.

An interesting collection of apples and pears was shown by Messrs. Smith and Reid, St. Catharines, Ont. Among the pears were Anjou, Kieffer, Josephine De Malines, Lawrence, Beurre Diel, Mount Vernon. Mr. A. M. Smith nearly always has some fine specimens of Princess Louise apples. Owing to the unfavourable autumn they were not as well coloured as usual this year.

The President, Mr. W. M. Orr, as usual, had some fine Vergennes grapes. Mr. Orr makes a specialty of packing these grapes in cork dust for winter use, and they are certainly good. He also had some immense specimens of Kieffer pears and some fine Idaho pears as well, likewise some fine quinces. Included with his exhibit were some exceptionally late peaches grown by Mr. Morrison.

Mr. P. McCullough, Burlington, exhibited a collection of well shaped and well coloured apples. Those which were particularly good were Ontario, King, Esopus Spitzenburg, Gano, Pewaukee, Hubbardston Nonsuch, Mann, Blenheim Orange, and Baldwin. The apples shown by Mr. McCullough were very creditable to him.

A very highly coloured and fine specimen of McIntosh Red was brought by Mr. Macoun, which had been grown by Mr. David Tait, Iron Bridge, Algoma. If such fine apples can be grown in abundance it will be a great boon to that part of Ontario.

Mr. C. L. Stephens, Orillia, sent a yellow apple for name which very much resembled the Porter. Another variety, sent by Mr. E. Powell, through Mr. Stephens, grown on the grounds of the late John Cuppage, Orillia looked as though it were of Russian Origin, but was unknown to the Committee. A variety which resembled the Seek-no-Further in outward appearances, but which was not that variety and evidently a seedling, was sent by Mr. Stephens. It was grown by J. W. Wainman of the Township of North Orillia, and said to be from a sucker grown from a dead Northern Spy, evidently the stock. It was a fine looking apple and a good keeper and is worth giving a thorough trial.

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Some specimens of a dark coloured seedling apple were sent by Mr. H. Wartman, Kingston, Ont., to Mr. L. Woolverton, who brought them to the meeting. The apples were of medium size and unusually dark in colour, being very dark crimson The flesh was white, tinged with red near skin, tender, and juicy and subacid, but slightly astringent. Quality, almost good. The tree is ten years old and growing along a public road, There were two barrels of apples on it in 1900. Season, midwinter.

The members of the Association were very much surprised by the fine specimens of Navel Oranges, and lemons which were grown at Victoria Park, Niagara Falls, by Mr. R. Cameron, Superintendent of the park, and sent to the Association by him. The oranges were as large as imported ones and were quite juicy and thought to almost equal the best in flavour. The lemons were also good. The trees were grown in half barrels which were kept inside in the winter. When such fine oranges and lemons can be produced in this country it is surprising that more persons do not produce them of the same quality as those grown by Mr. Cameron.

There were a few other collections, but as the name and address of the exhibitor was not attached they are not reported on.

W. T. Macoun, Chairman.
W. H. Dempsey
T. H. Race.

BY-LAWS FOR AFFILIATED HORTICULTURAL SOCIETIES.

Prepared by Mr. Thomas Beall and Mr. L. Woolverton, as ordered by the Board of Directors of the Fruit Growers' Association of Ontario.

This Society, known as the Horticultural Society of the of , organized under the provisions of the Agriculture and Arts Act of the Province of Ontario, Chap. 43, R. S. O. 1897, agrees to conduct its affairs in accordance with the several provisions of the said Acts, and with the following by-laws and regulations.—Sec. 13.

1. The members of this Society for any year shall be residents and ratepayers of this municipality to the number of at least fifty, and also others, who shall have paid one dollar into the funds of the society as membership fee for that year.—Sec. 7, s.-s. 1 (b).

2. The objects of this society shall be to encourage improvement in horticulture, and to secure to each member equal encouragement therein.—Sec. 9, s.-s. 2.

3. There shall be at least public meetings in each year for discussing local horticultural matters, and for hearing lectures on improved horticulture.—Sec. 9, s.-s. 2 (a).

4. At any public meeting there may be an exhibition of such plants, vegetables, fruits and flowers as may be in season; and wherever such an exhibition is held, there shall be present at least one expert gardener who shall give such information and instruction appertaining thereto as may be required; but no prizes of value shall be offered for competition by the society at such meetings.—Sec. 9, s.-s. 2 (e).

5. The annual meeting, and all other public meetings shall be open to the public free of charge. But members only shall have the right to vote at any meeting.

(*a*) When exhibitions are held at such public meetings, the public shall be invited to exhibit such horticultural products as may be thought suitable for the occasion by a committee appointed by the Board to superintend such exhibitions.

(*b*) This committee shall take such means as they think proper to secure exhibits for the occasion, and also procure proper conveyance for collecting and returning the same free of expense to exhibitors.

(*c*) These exhibitions shall be open to members and other exhibitors free of charge.

(6) A sum of money not to exceed dollars may be offered in prizes in any one year for essays on any question of scientific enquiry relating to horticulture.—Sec. 9, s.-s 2 (d).

7. Each member shall be given by this society a free membership in the Fruit Growers' Association.—Sec. 9, s.-s. 2, (b).

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8. There shall be procured for each member, trees, shrubs, plants, bulbs, or seeds of new and valuable kinds in each year, sufficient in quantity to exhaust the funds of this society after allowing for necessary working expenses.—Sec. 9, s.-s. 2, (a).

9. The annual meeting shall be held at half past seven in the evening of the second Wednesday in January, when there shall be elected a president, a first vice-president, and not more than nine directors, who together shall form the board of directors. At this meeting, the society shall also elect two auditors for the ensuing year.—Sec. 7. s.-s 1 (e).

(*a*) At this meeting, only those members who have paid their subscription for the ensuing year shall be entitled to vote.—Sec. 10, s.-s. 1.

(*b*) At this and all subsequent public meetings, ten members shall constitute a quorum.—Sec. 10, s.-s. 1 (e).

10. The board of directors at its first meeting shall appoint a secretary and a treasurer, or a secretary treasurer.—Sec. 7, s.-s 1 (*f*).

(*a*) Five directors shall constitute a quorum for the transaction of business.—Sec. 14.

(*b*) Subject to these by-laws, the directors shall have full power to act for and on behalf of the society, and all grants and other funds shall be expended under their direction.

At each annual meeting the directors shall present a detailed statement of the receipts and expenditures for the preceding year, and also a statement of the assets an liabilities of the society at the end of the year, certified to by the auditors.—Sec. 11, s.-s. (c).

11. The said statements shall, when approved by the meeting, be placed on permanent record in the books of the society, and such portions thereof, together with what is further required by sub, sec. (a) of Sec. 11, shall be sent within one month to the Department of Agriculture.—Sec. 12.

12. The Director of the Fruit Growers' Association of Ontario for the Agricultural District in which this society is situate shall be considered an honorary member and receive notice of the meetings.

13. These by-laws and regulations cannot be altered or repealed except at an annual meeting, or at a special meeting of the members of the society, of which two weeks' previous notice has been given by advertisement.

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'ST OF AFFILIATED HORTICULTURAL SOCIETIES.

No. of members.	Name.	President.	Secretary.
51	Belleville	W. C. Reid	W. J. Diamond.
69	Brampton	C. M. French	Henry Roberts.
59	Cardinal	R. B. Dowsley	E. E Gilbert.
123	Chatham	Thomas M. French	George Massey.
72	Cobourg	John D. Hayden	H. J. Snelgrove.
....	Cayuga	J. E. Skeele	A. K. Goodman.
54	Clinton	Alex McKenzie	Wm. Coates.
96	Durham	Chris. Firth	Thomas Brown.
55	Elmira	S. Laschinger	C. W. Schierholtz.
67	Grimsby	Mrs. E. J. Palmer	E. H. Read.
94	Guelph	Dr. Dryden	Wm. Ross.
73	Hagersville	Wm. Harrison	S. W. Howard.
158	Hamilton	A. Alexander	J. M. Dickson.
58	Hespeler	John Fisher	D Rife.
50	Iroquois	W. A. Whitney	A. E. Overell.
88	Kincardine	S. W. Perry	Joseph Barker.
86	Leamington	J. L. Hilborn	E E. Mackay.
114	Lindsay	W. M Robson	F. J. Frampton.
119	London	J. A. Balkwill	R. W. Rennie.
81	Meaford	Oscar Boden	A. McK. Cameron.
57	Midland	F. R. Weston	Miss M. Tully.
60	Millbrook	....	George Sootheran.
72	Mitchell	A. D. Smith, M.D	T. H. Race.
64	Napanee	Mrs. W. H. Wilkinson	J. E. Herring.
68	Niagara Falls	W. P. Lyon	T. J. Robertson.
52	Norwich	J. D. Hogarth	Wm Fairley.
108	Oakville	A. D. Chisholm	W. W. Paterson.
83	Orangeville	John McLaren	Wm. Judge.
63	Owen Sound	Dr. Allan Cameron	James Vair.
76	Orillia	G. I. Bolster	C. L. Stephens.
....	Perth	W. A. Meighen	A. W. Goodman.
57	Paris	John Allan	Gordon J. Smith.
103	Picton	A. M. Terrill	W. T. Ross.
50	Port Colborne	A E. Augustine	O. C. Kanold.
81	Port Dover	James Symington	Mathew Hodge.
110	Port Hope	H. H. Burnham	A. W. Pringle.
85	Seaforth	Wm. Ballantyne	Valentine Knechtel.
79	Simcoe	H. H. Groff	Henry Johnson.
89	Smith's Falls	J S McCallum	W. M. Keith.
59	St. Catharines	G. W. Hodgetts	D. C. Hetherington.
58	Stirling	Mrs. James Boldrick	G. L. Scott.
59	Thornbury	John G. Mitchell	A. W. Walker (Clarksburg).
85	Toronto Junction	F. C. Colbeck	W. H. Post.
159	Waterloo	Andrew Weidenhammer	J. H. Winkler.
100	Woodstock	G. R Patullo	J. S. Scarff.
114	Windsor	Stephen Lusted	John R. Martin.

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